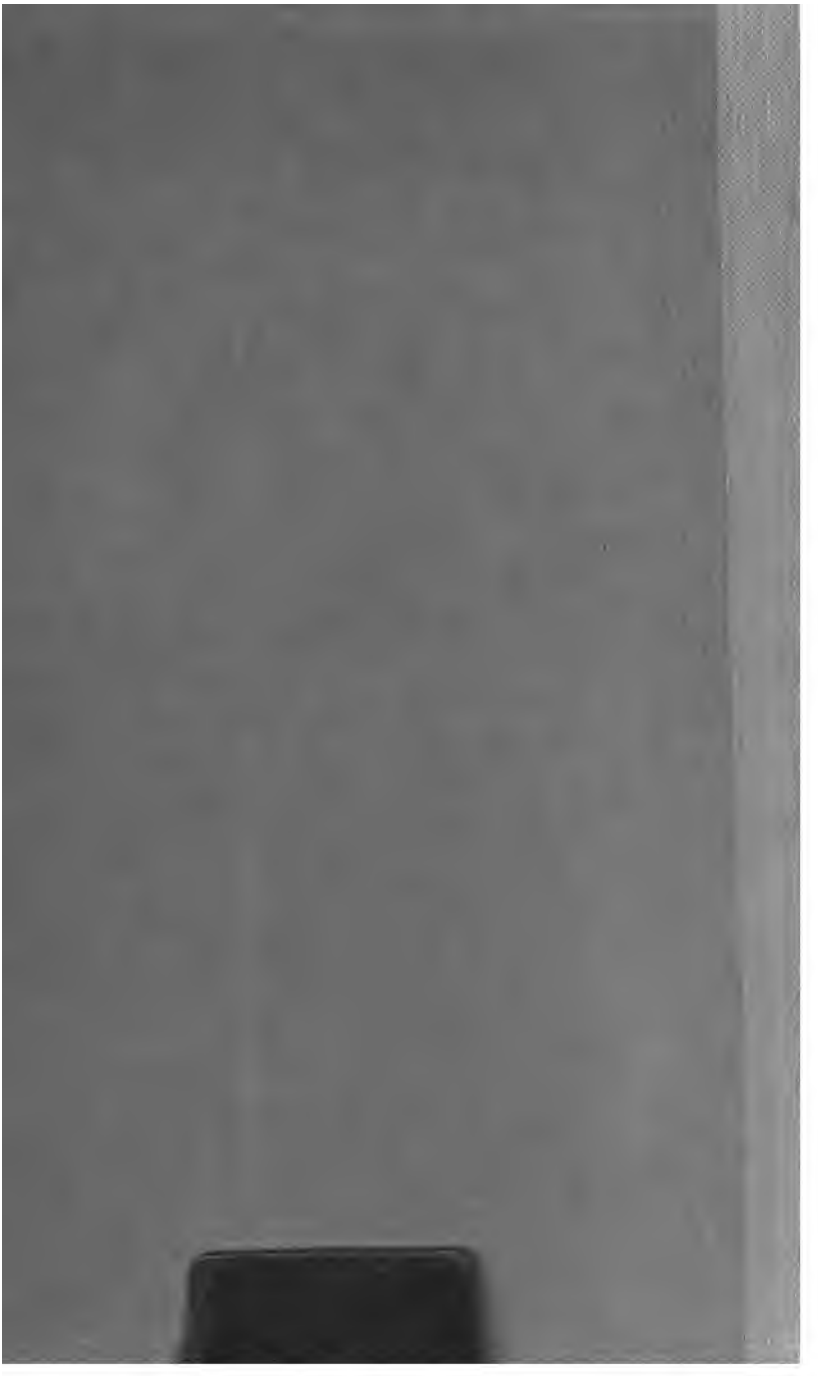


★Miss A. Hope

HOW TO BUILD

A HOME.

BEING SUGGESTIONS

AS TO

SAFETY FROM FIRE, SAFETY TO HEALTH,

COMFORT, CONVENIENCE, DURABILITY

AND

ECONOMY.

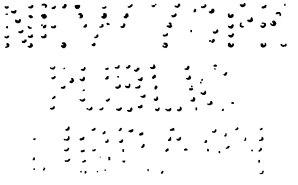
BY

FRANCIS C. MOORE,

PRESIDENT OF THE CONTINENTAL FIRE INS. CO.

NEW YORK.

1897.



PREFACE.

One builds a home, as a rule, but once in a lifetime. Unless an architect or builder by profession, he is liable to make serious mistakes and to overlook many things which would conduce to the comfort and safety of himself and his family. Even if he be an architect or builder, he will do well not to rely entirely upon his own knowledge, but to consult others. While he will be likely to escape oversights in proportion as he has had experience, especially if he has been systematic in preserving notes from time to time of discoveries and details for which the memory cannot be relied upon, it is safe for him to assume that some of his acquaintances, especially if experts, may know some things which he does not.

The writer of this has made a study of construction for more than a quarter of a century, and has been careful to preserve memoranda of details which commended themselves to his consideration, but when, at last, he builded for himself he sought advice and criticism of his plans and specifications at the hands of architects, carpenters, masons and other practical men with whom he

enjoyed acquaintance, with the result that he is able to say, after living in his house, that if building over again he would use the same plans for a second structure. It occurred to him that it would be well to give others the benefit of what he had learned, and in such compact shape that anyone contemplating the erection of a dwelling house would be able to understand the plans of his architect and avoid faults which are sometimes overlooked by the most competent experts.

If the following pages contain valuable suggestions, involving thorough, approved and economical methods of construction, it is due to the fact that the writer has not relied on his own judgment or knowledge, but has sought advice from numerous experts throughout the country, sending his book after it had been printed in "proof," to architects and builders everywhere, in his desire to obtain on every point the majority view where two or more methods of construction are followed. Every man has something to learn of all other men.

Mr. Bell, the architect and builder, and the author of a valuable work on carpentry and framing, in his preface says:

"When I had finished my apprenticeship, my old master assured me that I had now fully learned my trade and was myself a master workman, and I was elated with the thought that I knew it all; but on traveling to other places and working in other shops, I was soon made to feel my deficiencies, and from that time to this I have applied my mind to the study of my business."

It should be remembered that mistakes in the building of houses are not always limited in their consequences to the amount of money which might have been saved by better forms of construction. They are sometimes far reaching and involve not merely the structural strength

or habitable conditions of the entire building, but affect its commercial value to the extent of a large percentage of its cost.

It is an old saying that "fools build houses for wise men to live in," but it is questionable which is the greater fool of the two, the man who builds an inconvenient and irrational dwelling or the one who buys it of him after it has been finished.

While the following plans and specifications call for the best work and materials and may be used for large and expensive dwellings, they can be easily adapted to smaller and cheaper dwellings, as suggested under the head of "specifications," it being much easier for one who contemplates building to have before him a complete list of those features which tend to perfection in construction, in order that he may decide what to omit, than it would be to erect a dwelling of elaborate construction from plans and specifications intended for a cheaper building.

The reader who desires wider reading as to the best methods of construction, the rules of framing, joining, etc., will do well to read any or all of the following books:

Building Superintendence, by T. M. Clarke.

Baker's Treatise on Masonry Construction.

Building Construction and Superintendence, by F. E. Kidder.

The Suburban Cottage, by W. B Tuthill.

The Disposal of Sewage in Country Houses, by Wm. Paul Gerard, C. E.

Tredgold's Carpentry and Joining.

American House Carpenter, by Hatfield.

How to Frame a House, by Owen B. Maginniss.

The Art and Science of Carpentry Made Easy, by Wm. E. Bell.

Hallett's Specifications.

Guide and Assistant for Carpenters, by H. G. Richey.

An elaborate set of construction details, prepared for the use of students of the Massachusetts Institute of Technology, Boston, by Prof. F. W. Chandler, published by the Heliotype Printing Co., Boston, is also worthy of careful study.

A comprehensive treatise on construction, with numerous illustrations, will be found under the head of "Building," in the Encyclopedia Britannica.

"Laws Relating to Building," by W. J. Fryer.

The Building Law of New York may be regarded as an educational text book in correct construction. I think it will be conceded that much of its great merit is due to Mr. Fryer. Its few faults are those necessarily incident to compromises of conflicting interests and views, always to be expected where enactment is by committees and conventions.

HOW TO BUILD A DWELLING HOUSE.

"One of the most difficult portions of an architect's business is precisely that which amateurs usually imagine to be the easiest—the superintendence of the work connected with a dwelling house."*

In the following pages few suggestions will be found regarding what may be called ornamental architecture. Tastes vary, and each must and will follow his own inclination. It has been the aim of the writer to direct attention to those practical details which concern comfort, convenience, structural strength and safety from fire, leaving entirely out of the question all discussion of such matters as colors of paints, hard wood finish and style of architecture. Most of the suggestions will be found available, whether the building be brick, stone or frame, or whether the style be Colonial or Romanesque or Byzantine or "Queen Anne in front and Mary Ann behind."

Select a competent architect; not merely one of taste and experience, but one who combines with these recommendations the somewhat rare quality of systematic preservation of discovered facts, with the view to improving and re-adjusting his blanks for plans and specifications. It is unsafe to rely upon memory, and the architect who neglects to make memoranda of his mistakes and discoveries in the course of his practice is a safe one to avoid.

* Mr. T. M. Clarke in "Building Superintendence," an instructive and valuable treatise.

Under no circumstances should a man of any other profession be his own architect. It is an old saying that a man who is his own lawyer has a fool for a client, and it may safely be asserted that the man who is his own architect will have a house whose mistakes will cost him more than twice the fee of a competent expert. Select an honest architect, one who will not accept a commission from contractors or dealers in materials.

It will be well to stipulate that the architect is to employ a competent inspector who is to be on the ground daily and see that every detail is attended to. It is not necessary to have a high priced man for this work; most bright young men are thoroughly capable of undertaking it if they be good mechanics. Defective work is soon covered up if the contractor is dishonest, and casual visits of the architect himself are not sufficient to insure protection against fraud or errors. It should be remembered, too, that mistakes even if honest sometimes get to a point where correction is difficult if not impossible.

The advice of a sensible, practical woman, who is a thorough housekeeper, should also be regarded as indispensable. Therefore, if a man's wife answers this description of helpmeet, her husband will make a serious mistake if he fails to consult her at every step and secure her revision of his plans, especially in the important matter of closets, arrangement of kitchen, butler's pantry, etc. Her experienced and practical eye will discover defects which would never occur to him. It should be remembered that she occupies the house during the greater portion of the daylight hours, and it would be strange if she should not know proportionately more about what is needed for comfort and convenience than the head of the house. Her practical knowledge will be invaluable to him; she will see things that both he and the architect overlook; the need of a door here, a window there, a

closet in this place, the fault of a door hung on the wrong side in another; such objectionable features as steps between the butler's pantry, dining-room and kitchen, the floors of which should always be on the same level, to prevent the stumbling of servants with dishes, etc., etc. Women would make admirable architects, especially for dwelling houses, if they were able to climb ladders and properly supervise buildings in process of construction.

Tell your architect the amount you are willing to spend. It is claimed that it is best to put one's figure at 25% less than the maximum amount contemplated, but this theory presupposes an incompetent or dishonest architect, and it is better to have no dealings whatever with such an one. Employ an honest man and be frank with him. A tricky man will assume that you are naming a less figure than you are willing to pay and probably add 50% to it.

LAY OF THE LAND.

If the site is level and well drained, little needs to be done in the way of grading, except to dig the cellar. If, however, the building is to be on a hillside, whatever grading is necessary to secure a level site and the necessary terraces should be done before erecting the structure, and at the same time that the cellar is being excavated. At such time the work can be prosecuted at much less expense than after the building has been erected, and after it will stand as an obstruction to the removal of earth by the easier method of carts or earth scoops.

It will be found economical in the end to consult a surveyor as to levels, and it is, perhaps, unnecessary to suggest in the case of a house built upon a hillside that it will be economical of excavation and, also, of level ground, to arrange the long way of the house parallel with the face of the hill. In other words the style of the house should be wide rather than deep. This will save in expensive retaining walls and sod work.

PREVAILING WINDS.

If the house is to be a summer home, its arrangement should have reference to the direction of the prevailing breeze of the summer months, and the dining-room should be on the side so indicated, for the obvious reason that it must necessarily be occupied at least three times a day and should, for this reason, be the coolest and pleasantest room in the house; it being remembered that it is not necessary on warm days and evenings to stay in the library or drawing-room, but it is possible and preferable to seek relief from the heat on the piazza. In most localities the easterly and southerly exposure is the pleasantest side of a house.

For the same reason do not place your kitchen too near your dining-room; the butler's pantry and store-room should be between, not only on account of heat, but on account of flies and cooking odors. Even if a brick wall separates the kitchen from the dining-room, if the range or flue of the kitchen be next the dining-room, the latter will be heated to an uncomfortable degree. A kitchen under the dining-room is decidedly objectionable in a summer home.

TOP SOIL.

This is very valuable and should be first carefully removed to one side (where it will not be in the way, necessitating subsequent removal) to be readjusted upon the terraces or other surfaces for support of grass, flowers and other vegetation. It is often foolishly mixed up with the clay and sand, necessitating the purchase afterwards of good soil when top dressing is necessary.

DRAINAGE, GUTTERS, ETC.

In the case of buildings on side-hills careful attention should be given to these important features, and waterways should be intelligently studied by observation during storms before planning the gutters, road-boxes and sub-

soil piping, if any. Either of the two systems—surface gutters or subsoil pipes—should be sufficient in capacity, each independently of the other, to carry off the water of a heavy rainfall or cloudburst; but reliance should not be placed on the road-boxes and covered pipes alone, as road-boxes, even if of the best quality, are liable to be stopped up by dried grass or leaves. The surface gutters should be connected, therefore, so that a complete system of surface drainage for carrying off the water may be secured in addition to the underground pipes. Subsoil pipes where used should increase in size from the top of the hill to the bottom, commencing with four or five-inch and increasing to six-inch, eight-inch, etc., not less than 12-inch or larger pipe being used at the foot of the hill. While it is true that the smaller the pipe the more likely is it to clear itself and to prevent the accumulation of sand and rubbish, it should be remembered that its capacity must be equal to the maximum volume of water in exceptional storms, or damage will result.

GRADING.

Care should be taken to insure a safe flow of the water from the house on all sides, and it may be well to have a gutter two or three feet wide around the walls of the house, of brick, stone or concrete, underneath the sodding, so that in case of a cloud burst and the washing away of the soil the gutter would then throw the water clear of the house walls. Blind drains of broken stone around the foundations are in some locations necessary.

Where the ground is damp or springy, it is well to lay a course of dry stones on edge at least six inches in width, the cellar bottom to be graded before the stones are laid, so as to pitch the water to holes left through the foundation walls, and around the outside of the walls on the exterior of the building. A dry stone drain should be laid as low as the foundation, so as to take the drip of the

surrounding ground, the whole being connected with the drain on the outside of the building, so that the water may be carried off to a cess-pool or to lower ground. If the house be in the city and the cellar below the level of the sewer it can be drained to a cess-pool and afterwards pumped or siphoned out.

CELLAR.

It is wise to have the cellar under the entire house. It will cost little more than to dig a smaller cellar, and will insure not merely greater storage room (always convenient and desirable) but better ventilation as well as dryness in the house itself.

The cellar ceiling should not be less than seven feet high—better eight feet. It is mistaken economy to have a low studded cellar. The ceiling should be plastered on metallic lathing. This will be an effectual fire stop in case of fire starting in the cellar, where fires frequently originate, and will hold a fire long enough to insure the escape of a family.

The side walls should be white washed with two good coats of lime wash.

The floor should be covered with not less than three inches of good concrete, and a final coat of one inch of Portland Cement and good sharp sand in the proportion of one of cement to two of sharp sand. The concrete should be mixed in the following proportion: one part of Rosendale Cement, one part clean, sharp, grit sand, and five parts of best clean coarse gravel, thoroughly washed, or clean broken stone (small enough to pass in all directions through a 2-inch ring)—the latter preferable; all to be, by measure, thoroughly mixed dry, and water added afterwards. It is necessary to have the stone or gravel carefully washed, so that the cement may "bite" thoroughly, as any soil or dirt adhering to the stone will prevent a proper union.

To secure a thoroughly dry cellar where the surrounding soil is damp it is said that a "damp-proofing" of three-ply sized paper and asphalt under the concrete is an important and economical precaution. It is also well, as already stated, to have "blind drains" around the footing of the foundation. These are made by broken stone pounded in, through which the water finds its way to some lower and safer point.

It is well to have a drain at some point in the cellar, running out under the walls, with a perforated iron plate or box, so that any unusual flood of water in the cellar would be immediately carried away beyond the point of danger or annoyance. A four-inch cast-iron pipe carried out under the wall in this way when the cellar is being built, the floor being inclined slightly to the drain, will cost very little and may save serious trouble, especially in the case of buildings on sidehills.

It is mistaken economy to lay cellar walls in other than cement mortar or to neglect concreting the floor. It is an old saying that a wet cellar is better than a damp cellar, and that "a damp cellar weaves shrouds for the upper chambers."

It is desirable in getting estimates to have the specifications provide for coal bins, closets, etc., in cellar. Attention to such matters will save considerable money as compared with what the expense will be if left for subsequent contracts.

COLD ROOM.

It is desirable to have a room for milk, food, etc., in the cellar, made of a light framework of wood covered with a wire netting—either the green netting or copper netting; the latter is better on account of immunity from rust—the interior fitted with shelves. It will cost little, especially if included in the specifications and estimate for the house.

the fact that bricks laid with Portland Cement and five parts of sand, the bricks being laid dry and warm, insured good results.

A New York builder of large experience and for whose judgment I have great respect writes me, after reading proof of this book: "I have found during many years of experience that good cement, with dry bricks, is the proper material for mortar in freezing weather—never lime." I am of his opinion and find many others think so too.

It is the generally accepted opinion that stone is a better material for foundations below ground than brick; but stone is seldom laid properly, and good stone masons are scarce. It is a quite common practice to let the stone project beyond the rear line of the wall and sometimes to break it off with a hammer after the wall is dry—a most vicious practice. Moreover, sufficient mortar and cement are not always used. Taking into account that it is easier to lay bricks and bring them to a proper face, it is questionable whether a brick wall well laid in cement mortar, plastered with Portland Cement on the outside, and afterwards covered with two coats of liquid asphalt, is not, on the average, a better wall than one of stone. It certainly is unless the latter is exceptionally well laid. It should be remembered also that stone, especially lime stone, is liable to disintegrate if water to extinguish fire is thrown upon it while hot. For this reason stone piers and stone columns may be dangerous in cellars—particularly so in warehouses.

RETAINING WALLS.

Where these are necessary for "retaining" or sustaining earthen banks they should be constructed of heavy stone, what is known as "two-man" stone (requiring two men to handle it), and the wall should be "battered" back; that is, it should lean back against the bank, and not be constructed with a plumb or vertical face. It should be one-fourth of its height in thickness, but at least two feet six inches thick at the bottom if seven feet high,

and should go at least one foot below the level of the ground, and it should be laid in cement mortar; but the middle of the wall should be laid dry for a large portion of its face, so that any water accumulating behind it may drain off, and not freeze to throw out the wall. Some experts prefer to build the entire wall in cement mortar, leaving "weepers" so called, or small drain holes, through the wall every four feet at the bottom. The upper portion of the wall two or three feet from the top should also be laid in cement, and the whole should be coped with stone laid in cement mortar, or the wall should have a coping of cement in the proportion of one part Portland Cement to two of sharp sand, smoothly troweled. Retaining walls, as a rule, should not be less than eighteen inches in thickness at the top.

FRAME DWELLINGS.

It is the generally accepted opinion that the healthiest dwelling house for the climate of America is one of frame, especially where the building is located near enough to the seashore to be subject to the dampness incident to the location.

FRAMING AND TIMBER WORK.

There are two methods of framing the beams, joists and vertical timbers of wooden dwellings, viz., the "braced" frame and the "balloon" frame.

In the "braced" frame, girts for carrying the floor beams of the floors above the first are framed into the corner posts; (which should extend to the wall plate) those supporting the ends of beams being dropped to secure a level with the side girts (for this reason they are called "dropped girts.") On these girts the studs of the outer wall and partitions are framed, so that each story has a separate set of studs. At all angles, also, there are angle braces, tending to strengthen the structure. The whole matter is fully illustrated on page 75.

In the "balloon" frame the studs as well as the corner posts are carried from the "sill" (*i. e.*, the flat timber which lies along the top of the foundation wall) continuously to the "wall-plate," usually called the "plate" at the top of the wall; and the floor beams of the second and third stories are carried by pieces 2x6 called "ribbons" spiked securely to the studs. This form or "balloon" frame, costs somewhat less than the "braced" frame, and if well braced, with long struts and interties, is strong enough for all practical purposes. Indeed for country houses it forms a very rigid structure.

In the case of both the "braced" and the "balloon" frame, the outer or "enclosing" studding is sheathed with sheathing boards for the reception of the shingles or clapboards, and if this sheathing is put on properly it is an additional element of strength The whole matter may be understood by referring to the diagram, page 75.

As already stated, the vertical timbers are in single lengths from the sill to the wall plate. Where it is necessary, however, to splice two pieces of joist together it should be done by fish-plates, so called, or splices of inch board three feet in length, nailed, like splints for a broken limb, securely on both sides of the splice. If the bearing is true and square a spliced stud is strong enough, but there should not be more than two or three in a side wall or partition.

It is important to avoid the footing of joists or partitions on floor beams, in order to have as little shrinkable timber as possible in the line of a vertical support. Wherever possible, therefore, the studs should pass down between the floor beams and foot upon the sill itself, or upon the cap of a partition below. Where the stud of one partition foots upon a brick or stone wall and the studs of a parallel partition foot upon a girder or floor beams, unequal settling will occur, due to unequal shrinking,

throwing the floors out of level and cracking the plastering. The architect and builder should provide for this, as it can easily be remedied by letting the studs into the girder or by building up one side or the other so that equal quantities of shrinkable timber come under both sets of studs. This is an important matter sometimes overlooked. It has been provided for in the accompanying specifications.

Where it is necessary for a partition to foot upon a tier of floor beams it should foot upon a sole or strip of yellow pine one inch thick, of the width of the studs, the studs being so arranged that each stud will come over a beam. The less timber under a stud, for reasons already explained, the better, to avoid the effects of shrinking.

Each pair of floor beams should be cross bridged at intervals of seven feet in their length. See page 76.

The studs of partitions should be bridged or braced, as this adds to their strength and very little to the expense.

The framing of the roof should be carefully attended to, as suggested on page 31.

SIDE WALLS.

A very durable side wall as well as a tasteful one is a shingle wall. Cedar shingles change with the weather to an artistic gray tint which is decidedly pleasing to the eye, but creosote stains of various shades of color are obtainable, so that the owner may gratify any preferences he may have for other colors than "weather gray."

If creosote stains are to be used the shingles should be dipped and allowed to drain dry into a gutter or tub before being nailed on the roof.

SHEATHING.

As a preparation for the shingle finish, the outside of the house should be sheathed with boards—hemlock will answer—preferably not over six inches wide. The sheathing should be tongued and grooved and planed one side.

It costs little more and is a great advantage, not merely because more weather-proof, but because the lumber is planed to a uniform thickness. It should be driven closely together before nailing. Differences of opinion prevail as to whether these boards should be attached to the upright timbers or studs by being nailed horizontally or diagonally. It is claimed that where side walls are covered with clapboards the joints between the clapboards may be coincident with the joints between the sheathing boards underneath. With shingled side walls it makes little difference. I am inclined to think, after careful investigation of the subject and consultation with experts, that greater strength will be secured in the frame-work of the house if the boards are nailed horizontally to the upright studding.* On this outer sheathing should be fastened a heavy quality of water-proof building paper, and upon this surface the shingles should be carefully nailed, with galvanized iron nails. They cost little more than the ordinary cut nails, while they will last much longer. Probably fifteen dollars in the case of a good sized house would pay the extra cost of using galvanized nails.

BACK PLASTERING IN WOODEN HOUSES.

An admirable and inexpensive feature of either a summer or winter house is "back plastering," by which is meant an extra coat of rough brown plaster on lath between the outer sheathing and the inner or finish plaster, thus securing two air spaces. The lath should be furred out from the sheathing so as to secure a good "clinch" or "key" to the plaster and an air space between it and the sheathing. Such a house will keep out the heat of the summer and the cold of winter, while the extra expense will not be great and will be fully justified by the comfort secured for the entire lifetime of the building. Under no circumstances should it be omitted. It is customary in some localities to fill in the space between the inner plas-

* Probably, for the same amount of material, a dry-goods packing box will *show as much structural* strength as any form of building. Its side boarding is *nailed horizontally*. I doubt if any one would claim that it would be as strong if *were nailed diagonally*. A properly constructed building, with horizontal *eathing and the framework* securely braced and nailed, is sometimes turned *over end by a wind* storm without breaking it to pieces, in tornado sections.

tering and the outer shingle sheathing or clapboard finish with bricks and mortar: lime mortar, not cement mortar, should be used on account of the danger of dry-rot. Back plastering while not so effective a "fire-stop," is less expensive, and the two air spaces form a good non-conductor.

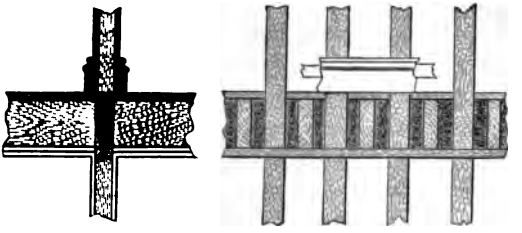
FIRE-STOPS IN HOLLOW PARTITIONS, FLOORS, ETC.

Probably no subject deserves more thoughtful consideration at the hands of architects, builders and underwriters, than that of improving the fire-resisting properties of ordinary frame or brick dwellings, especially in isolated locations where they are beyond the reach of fire departments. Under present methods, a frame dwelling or, for that matter, a brick dwelling of ordinary construction, once on fire, is seldom saved. With defective floors, hollow partitions, open staircases and hollow spaces in side walls from cellar to roof, affording drafts and flues for carrying flames, modern dwelling houses are actually constructed on the principle of lungs for breathing flame. Even if the outer walls are of brick or stone they do not retard combustion, since the conditions for it are simply those of an ordinary stove, whose contents are not more judiciously arranged to insure rapid combustion than are such interiors. It rarely happens that a fire, starting at night in the cellar or in the lower story of a dwelling, is extinguished short of loss to life and property. This ought not to be the case, as it is due to criminal indifference to precautions which are comparatively inexpensive and which ought naturally to occur to any intelligent mind.

Even a wooden dwelling may be so constructed, at slight expense, as to resist the progress of fire and prove slower in burning than the average brick or stone structure. It should be remembered that fire finds rapid runways from the cellar or lower portions of a building to the

garret or roof through the hollow spaces behind furring strips nailed for plastering on brick walls and behind the plastering and between the studs or upright joists or timbers of the structure. If not provided with a draft, fire makes little progress, and if not supplied with air will go out. It is, therefore, only necessary to cut off all of these upright air spaces, which otherwise become flues for its rapid progress. It is important that there should be a "fire-stop" at every floor and it can be inexpensively secured.

At each story where stud walls or partitions rest on walls or other partitions the spaces between the floor joists immediately under such walls or partitions and between the sides of such joists and to a line six inches above the top of such joists should be filled solid or flush with face of plastering on both sides with bricks laid in mortar, or mortar mixed with proper proportions of plaster of Paris to harden it; and if such studs or partitions rest on solid timber or joists for the whole length thereof, such fillings should be placed from the top of such joists to the same height as above specified, or a strip of tin or galvanized iron at least one inch wider than the width of said studding and continuing under the footing of such walls or partitions, may be substituted for the filling above described where there is no partition or wall under.



FIRE STOPS IN FLOORS AND PARTITIONS.

The building law of New York requires that in all furred walls the course of brick above the under side and

below the top of each tier of floor beams shall project the thickness of the furring, more effectually to prevent the spread of fire.

A wooden house so constructed, with all air passages cut off, with metallic lathing for the ceilings and Salamander between the floors, will resist a fire much longer than ordinary brick or stone buildings in which such simple and inexpensive but most important precautions are omitted. It will not cost one hundred dollars extra to construct a building in such a way that ample time would be secured for the escape of a family even if a fire should start in the night, and it is almost criminal to erect buildings for the habitation of human beings on modern fire-trap principles. Take, for instance, the simple precaution of throwing a few shovelfuls of ordinary lime mortar into the hollow space at the foot of ordinary "fore and aft" partitions, such as those which divide the rooms from the hall-ways of dwellings, it would seem that a conscientious builder, even if he were not paid under his contract for taking this precaution, would not neglect it. If, at every floor, he should let his workmen cast in the broken bits of brick, loose mortar and incombustible material which he afterwards carts away at an expense, he would make a partition almost as fire-proof as if filled in with brick from top to bottom, it being borne in mind that the danger of an ordinary partition lies not in the fact that it is not filled in solidly with brick or that it has an air space, but that this air space extends from one story to another, creating a flue for a draft. This matter is more fully explained by the accompanying illustration on page 22.

FIRE-EXTINGUISHING APPLIANCES.

It is an admirable precaution to have a two inch standpipe from the tank in the attic, with one length of fire hose, and a nozzle attached, at each floor, near the stair-

case. This may insure the extinction of a fire in its incipiency at a time when a little water promptly applied is worth a whole fire department later. This suggestion, comes to me, strange as it may seem, not from an underwriter, but from a practical builder. The standpipe and the hose may be covered in with a neat cabinet finish, or the attachment may be in the bathroom, with a sufficient length of hose to reach any portion of the floor.

Filled pails of water are admirable precautions, also. There should be a supply of these in the attic, so that in case plumbers or other mechanics are working with fire pots about the water tank or on the roof the water may be available, care being taken to empty them in case the house is closed during cold weather. A little salt in the water, however, will tend to prevent it from freezing in ordinary low temperatures.

FLOOR BEAMS OR JOISTS.*

These are usually only two inches thick and ten inches wide, merely two-inch planks on edge, but the extra cost of using timber three inches thick and twelve inches wide for floor beams, set sixteen inches on centres, (*i. e.*, 16 inches from centre to centre or 13 inches apart) will be fully justified by the stiffness of the floors, the prevention of cracks in plaster ceilings and walls due to vibration and also by the resistance to fire which such beams would present, withstanding combustion sufficiently long, as a rule, to enable the family to escape. Floor beams moreover, have to be cut from one to two inches deep for the passage of gas pipes, etc. These often invade a 2"x10" beam to the point of danger. Georgia yellow pine is the best material for beams, but either spruce or hemlock makes fairly good floor beams and, if well seasoned, neither is apt to twist seriously, especially where of the size recommended. I think yellow pine beams well worth the difference in cost however.

* *In some sections of* the country they are called joists altogether.

It is best to support interior girders in cellars with 8″ brick walls. If supported by girders on piers these should be at least 12″ square—16″ is better.

FLOORS.

These, where the extra expense (and it is not great) is not objectionable, should be double. The lower floor may be of hemlock or of other cheap wood, while the upper should be of Georgia pine, (unless oak, maple, or other hardwood floors are preferred.) Where comb grain pine is specified (so named because the grain is straight and in appearance like the artificial graining done by the grainer's comb,) the best results may be secured as to wear and appearance. If woodfilled and then waxed, it makes a neat border for rugs. This arrangement of the grain is secured by sawing the logs quartering, so that the growth rings are seen on edge; instead of sawing the log by cuts parallel with the tangent of the circumference, by which process the cuts nearest the bark are less valuable and the planks less hard as they approach the bark. Of course, comb grain, while more durable, is more expensive. If the entire floor is to be covered with matting or carpet, the ordinary North Carolina pine, which has been deprived of its pitch, for rosin, turpentine, etc., is cheaper; it is harder and better for floors than either spruce or white pine. It should be clear of knots and free from sap, shakes, etc.; that is to say, the sap side or softest side of a board, *i. e.*, that side which in the tree comes nearest the bark, should not be the top or exposed surface (although it is hardly necessary to examine for faults where comb grain is specified in the contract.) Where a piece of flooring is planed on the sap side it will sliver under the foot and wear out rapidly, soon becoming unsightly. These objectionable pieces may be easily detected, as the growth rings of the tree show plainly if the wrong or sap side of the board is the one which has been

planed. A careful mechanic will not make the mistake of planing a plank on the sap side, but enough of such carelessly planed lumber is to be found in every lot to warrant careful assorting. The specifications should require "the best seasoned clear, comb-grain Georgia pine, free from sap, shakes and knots, $\frac{7}{8}$ inch thick, not over $2\frac{1}{2}$ inches in width, tongued, grooved and planed, blind nailed," *i. e.*, the nails being driven in the tongue of each piece as the floor is laid, so that the head of the nail does not show in the top of the floor.

Flooring should be carefully dried; the best kiln-dried or time seasoned material only should be used. Care should be taken, also, to protect it from the weather after it has been brought on the premises, for even if kiln-dried if it becomes wet afterwards from rain storms it may be seriously injured and develop faults long after the floors are laid. It is so easy to protect it from rains that neglect to do so is inexcusable.

The under floor planks should be nailed diagonally but, if parquet flooring is to be used, crosswise of the beams.

It will be found advisable to put between the two floors—the lower of hemlock and the upper of pine—a layer of asbestos paper,* or of Salamander—an article manufactured by the American Fire-proofing Co., of Boston. This material is both water-proof and fire-resisting; it will delay the progress of fire through a floor for hours. It is made of strong, tough building paper board, coated with a water-proof and fire-proof cement on both sides. When finished, it is not unlike a sheet of slate. It is not expensive and forms an excellent filling for floors and has some deafening properties.

While the lumber specified for the floors should all be according to standard, that for the main hall, library and drawing room should be the pick of all, for obvious

* *Asbestos absorbs* moisture and should not be used near the seashore.

reasons, and a builder taking proper interest in his work would naturally see that these floors were carefully selected. The "cull" lumber (although strictly there should be no choice) should be put in the closets, store-rooms and upper or attic rooms. It is, therefore, desirable when the flooring lumber is on the ground to have it carefully sorted, so as to take the choice pieces for the best rooms.

The floor of the kitchen need not be of clear lumber, but should be of the best quality of hard lumber, free from sap, shakes and knots. It should be finished in oil, so that it can be scrubbed often.*

It is advisable to have a small "quarter-round" or other moulding where the base boards join the floors to ensure clean and easy sweeping.

FLOOR DEAFENING.

There are numerous plans for deafening floors so as to prevent sound from traveling from story to story. One of the best is to have a layer of cinders and concrete underneath the top floor,carried by thin deafening boards, resting on cleats fastened on the side of beams or joists as shoulders. The mixture for this purpose should be one of cement, two of sand and five of well screened cinders mixed with as little water as possible. Mineral wool is, also, available for this purpose. The most important floor of all for deafening, however, is the one which, strangely enough, is generally overlooked by builders and architects, viz., that above which the servants' rooms are located. The noise made by them is generally more disturbing than that made by the family, because of their earlier rising.

PIAZZA.

This should be wide, not less than twelve feet in width, depending upon size of house. It will cost little more than a narrower one and will add materially to the pleasure of the home. It is well to carry it for a short distance,

* *Most housekeepers* prefer linoleum on kitchen floors.

at least, around each of the two sides of the house, as well as in front, so as to secure sheltered nooks no matter which way the wind may blow or the sun may shine. If carried entirely around the sides it will darken the first floor rooms and prove objectionable on that account.

Under no circumstances should sap lumber be allowed in the piazza floor, as it decays when exposed.

In finishing the ceilings, eaves and facia of the piazza, resting places should be avoided where birds, especially sparrows, would be tempted to construct nests.

The flooring should be of Georgia pine, kiln-dried or vulcanized, not more than 2½ inches in width and not less than 1⅛ inches thick when dressed, and the joints, tongued and grooved, should be laid in lead paint mixed thick. There should be a fall of at least three inches between the front of the piazza and the back if twelve feet wide, or ¼ inch to the foot, to carry off rainwater.

The flooring of the piazza should be carefully "blind nailed," *i. e.*, nailed in the tongue of each piece; and, at its junction with the house, especially if it is a stone house, should be carefully calked, to prevent leaks. It is best to dress the stone to a smooth edge at the piazza level to ensure a water tight joint.

It is advisable, if the outside steps of the piazza are of wood, to have them bored with small auger holes, in some ornamental pattern, to insure the running off of rainwater, which otherwise will stand on the steps after they have been warped into curved shapes by the sun and lead to their decay. If this precaution is provided for in the specifications it will save half the expense of having it done later.

Probably a better method still is to make the outside steps of strips 1¼ inches thick and 2 inches wide, placed an eighth of an inch apart and blind nailed, the outer strip being three inches wide, to allow for the projection

or nosing. This will obviate the necessity for boring auger holes and will secure a dry step, which will not warp.

The piazza columns where they set upon the piazza are apt to rot from moisture getting underneath. It is best to putty the joints between the base of the pillar and the floor plank for this reason.

ROOF.

This may be either of slate, tin, copper or shingles, according to the taste or purse of the owner. If copper is used tinned copper is necessary for soldering. If shingles are used they will be improved both as to fire-resisting properties and leakage if laid in mortar. This is expensive however. Slate should also be laid in mortar; it forms a good bed and tends to insure against breakage of the slates. The slate should be laid with not more than seven inches "to the weather" even if 9x18 in size, (*i. e.*, with not exceeding seven inches of each slate uncovered by the the one above.) A difference of opinion exists as to whether small slates or large slates, 9"x18", are the best. Probably 9"x18" are preferable. The expense of rounding the points is not justified by the improvement, if any, in the appearance of the roof. Slate makes a hot roof in summer, but if laid in mortar, which is possible where the roof is slated in non-freezing weather, the upper rooms of the house will be much cooler.

If shingles are used they should be specified to be of "first quality," of cedar or cypress. Split shingles, hand shaven, are, as a rule, better than sawed shingles, but there is little difference and some advantage in uniformity of thickness in the case of the sawed shingles. "First quality" implies uniform sizes as well as freedom from cross grain, and great care should be taken to see that the shingles come up to the specifications and that they are not laid with a greater number of inches to the weather

(*i. e.*, uncovered) than called for by the specifications. Bass-wood shingles are decidedly objectionable and should not be used in any case; they feather or fur up under the influence of the weather and are very liable to ignite in dry seasons from chimney sparks, besides being liable to leak. If possible, shingles should be laid in lime (not cement) mortar; they not only form a cooler roof, but a more durable one, and afford better protection against fire in case of ignition from chimney sparks, etc.; indeed, a roof of shingles laid in lime mortar is almost as good for resisting fire as one of metal. The mortar should be lime mortar, which does not rot wood. Cement mortar is objectionable because it is apt to rot the shingles by confining the moisture and preventing its escape.

The attic in the peak of the roof above the upper rooms should be ventilated, so as to secure a circulation of air—an important precaution for houses built in warm climates. The ventilating windows may be protected from the weather by the projecting eaves, the openings being on the under side, as shown in the accompanying plans. It is usual to neglect this simple precaution for the reason that the space next the roof is over the servants' rooms; but, inasmuch as upon the health and comfort of the servants largely depend the health and comfort of the proprietor and his family, it is well to be considerate of them in a matter which costs so little money.

All pitch roofs should be securely braced and supported. The wind pressure in severe storms is tremendous, and unless the roof is thoroughly staid leaks will develop. Such precautions add little to the expense of the building if provided for in the specifications. It requires only a few cheap timber braces applied horizontally and vertically in the attic to secure protection against unusual storms.

In small frame houses, where the roof rafters do not exceed 12 feet in length, it is sufficient to notch them securely to the wall plate, spiking them strongly. Where greater lengths of rafters are necessary various forms of trussing or bracing are provided. The simplest is to nail a beam below the apex of the roof between every alternate pair of rafters, thus tying them together. This is called a "collar beam." The rafters and the collar beam take the form of the letter A—the collar beam being the cross stroke. If it is desired to still further strengthen this an upright piece, known as a "king post," may go from the collar beam to the ridge board. If it is desired still further to strengthen the roof a tie beam is carried across the building from the butts of the rafters, and two posts known as "queen posts" are carried from this tie beam up to the collar beam from which the king post ascends to the peak of the roof. This form of truss, however, is necessary only in the case of very large roofs with rafters of spans of 50 feet or more. See page 75.

It is customary in pitch roof houses to frame square servants' rooms with horizontal ceilings inside of the peak. Where this is done the attic ceiling joists correspond in tying and bracing qualities to the collar beam, while the upright studding for the side walls correspond with the queen posts, so called, and even a very large roof would need no other bracing.

FLASHINGS, GUTTERS, LEADERS, RIDGE-ROLLS, ETC.

By "flashing" is meant the sheet metal used on roofs where there are angles or valleys in which the shingles or slate come in contact with a chimney, dormer window or other vertical projection through the roof. The flashing in this case should be of "16 oz. H. C." sheet copper—half-cold rolled copper—instead of tin or galvanized iron; it costs little more and is preferable on account of its immunity from rust. It is much cheaper than it used to

be. The sheet metal should come well up under the shingles or slate on each side, not less in any case than ten inches, so that water cannot back up and leak through. Where a long roof adjoins a vertical chimney or the side of a dormer window the flashing should extend up under the slate or shingles fully eighteen inches on the upper side.

All ridge-rolls, flashings, hangers for gutters, etc., should be nailed with copper nails; if the expense is objectionable, galvanized nails may be used.

Ledges, hollows or level surfaces which would afford lodgments for snow, should be avoided in roofs. If they are unavoidable, as, for example, the valley or shoulder formed on the upper side of a chimney against a higher peak roof, snow may be prevented from lodging by constructing small angular sheds or "crickets," so called, covered with copper or lead, so that if snow finds a lodgment it will, the moment it begins to melt, slide off, and not back water up under the shingles, slate or flashings.

By "ridge-roll" is meant the roll along the ridges of the roof and on the peaks of dormer windows, etc. These should always be of metal preferably of copper.

DECKS FOR BALCONIES, OR PORTICOES OVER BAY WINDOWS, ETC.

These are sometimes covered with wood, or with heavy, painted canvas. A better material is sheet lead; it will stand the wear and tear of walking and can be easily repaired if a leak should develop. It is almost universally used in the older countries of Europe, and especially in England. The quality specified should be four pounds to the square foot. Where, however, the lead is exposed in a warm climate to high temperatures and the full effect of the sun it is apt to expand; in such locations copper or zinc is preferable. Decks should be inclined to throw all water free of the house.

Where tin, copper or zinc is used for decks of balconies a slat floor should be provided, laid in suitable sections, to save the wear and tear of walking over the surface.

CHIMNEYS AND FLUES.

All chimneys should be built from the ground; the walls should not be less than eight inches in thickness, and the flues will be improved from fire-resisting and draft viewpoints if lined with a burnt clay or terra cotta flue lining. It is quite common to erect chimney flues only four inches or half a brick in thickness. Such flues are very dangerous. Careful examination of the statistics of fires throughout the United States shows that one-fifth of all the fires in dwellings are caused by defective flues. In view of the fact that it costs very little more to make the flue wall eight inches in thickness instead of four, such neglect is simply criminal. A chimney with only four inches of brick work, especially in the side next the weather, makes a cold, chilled flue and a bad draft.

Carpenters not infrequently fasten their work in process of construction by driving nails or wooden pegs into chimney breasts; in the case of the four-inch flue wall there can be but one result.

Before deciding upon a "half brick" chimney, ask your architect how much additional it would cost you to build an 8-inch chimney. You will probably not only build an 8-inch chimney, but you will line it with burnt clay pipe. If, after learning the extra expense, you are willing to risk your own life for the difference, and do not regard the safety of your family, read what kind of a man St. Paul says is "worse than an infidel."

Be sure to decide upon the number of fire-places and chimneys required before getting estimates. They cannot be introduced after the building has been begun without risk of dangerous construction and the certainty of added expense.

All floor timbers should be "trimmed" clear of the hearths and brick-work of the chimney, so as not to be in contact with it at any point. This is easily secured by what are known as "header" beams, carried in front of the fire-place and at least twenty inches from the chimney breast, supported by the "trimmer" beams which enter the wall on each side of the chimney. These should not approach the side of the chimney closer than four inches. The intervening "tail" beams, as they are called, are mortised into the "header." Where more than three tail beams are framed into the header, however, it should be supported in "stirrup" irons (sometimes called "bridle" irons,) by which the weight is carried on the trimmer beams without mortising into them by "tenon and tusk" joints, which sacrifice material and carrying capacity. In this way the floor beams are free of contact with chimney flues. The Building Law of New York City requires (what should not in any case be neglected) that all hearths shall be laid on trimmer arches of brick carried across from the chimney breast to the "header" beam already described, so that the hearth shall not rest upon or near wooden beams in any case. This whole matter is more fully explained by the accompanying illustration on page 79.

Where a chimney passes through the roof it should be flashed with copper to prevent leakage. Under no circumstances should the brick-work of the chimney be extended out over the roof by the projection of the course of brick nearest to it. Such a shoulder or overhanging projection will inevitably cause cracks in the chimney in case the chimney settles; the roof in such event lifting the upper portion by means of the overhang or shoulder and causing a crack at the most dangerous of all places. The chimney should be carried up of uniform thickness to the top, copper flashing being relied upon to prevent leaks.

The chimney should be coped with a 3-inch blue stone, and it is important to see that the holes cut in the cap-stone correspond in size with the flues; otherwise shoulders will be formed and the draft of the flue interfered with.

Flues in throat capacity should not be less than eight inches square on the inside; preferably for fire-places in which wood is to be used, they should be eight by twelve in the clear. Green or unseasoned fire-wood will require a flue of this size to insure a good draft and prevent smoking. The furnace flue should be not less than 8″x12″ in any case.

Be careful to see that the flues are built according to the specifications and that details recommended are not ignored by the mason. If not watched at the time the chimney is being constructed faults cannot be remedied afterwards. The chimney should be so planned as to carry the flues as nearly straight as may be to the top. A horizontal or flat flue built in a straight way should never be allowed. All flues should be as nearly vertical as possible.

Masons are often careless about lining the flue even where the specifications call for it, and are apt to omit it until they get to the straight part of the flue. This makes the flue dangerous at its hottest point, near the fire-place, especially where it is surrounded by only four inches of brickwork, and it is important to caution your architect and his inspector, and perhaps to look after the matter yourself, in order to make sure that the flue lining is carried from the throat of the fire-place, as called for in the specifications.

Where flue linings are not provided be careful to see that all joints are struck smooth on the inside and that projections of bricks or mortar are not allowed. and also that no parging or plastering of the inside of the flue is

permitted under any circumstances. The plastering is apt to fall afterwards, under the influence of heat and rain, and not only to stop up the flue but to tear out the plaster between the joints of the bricks. The flue lining will prove the cheapest in the end, for it will maintain a smooth throat for the entire life of the flue, and moreover will tend to prevent the building of nests by chimney swallows, which prefer rough interiors.

STOVE OR SMOKE PIPES.

If a stove should be placed in a room in which there is no smoke flue and the stove pipe has to pass through a lath and plaster partition to connect with one, great care is required to make it safe. This may be done by placing a smoke pipe guard casing through the partition at least 8 inches larger in diameter than the pipe, perforated with holes in its ends. If the smoke pipe should be connected to a furnace and is heated to a high temperature, then the diameter of the guard casing should be increased to a suitable size. The stove pipe should not be placed closer than 6 inches to woodwork, and at this distance it is always well to shield it.

SMOKING FIRE-PLACES.

Be sure that your architect and contractor understand the importance of building the fire place and flue correctly, or a smoking chimney will be the result. The fire-place should not be higher than 26 inches above the floor—25 would be better—as the higher the fire-place the more cold air will enter to prevent a good draft. The flue should ascend directly from the centre of the fire-place, and if it is necessary because of fire-places on floors above to carry the flue to one side, it should be drawn by easy inclines to the side; and, as already stated, if wood is to be used, an 8x12 burnt clay lining pipe should be inserted. Round flues usually draw better than square flues. Wherever possible, a 10-inch round flue should be

used, and the flue lining should be put together with collar joints tightly cemented, the same as for drain pipe. Fire-places for burning cord wood are often desired. These should be 4 feet 6 inches wide and from 2 feet 6 inches to 3 feet 6 inches high. For these large fire-places circular flues 12 inches in diameter are advisable. You cannot be too watchful of the building of your flues.

The brickwork of the back of the fire-place should be brought forward, commencing at a point six courses of brick from the hearth. This tends to contract the flue toward the top of the fire-place and to insure that the air at this important point is thoroughly heated, which greatly improves the draft.

Where these precautions have been neglected and the fire-place is too high, a smoking chimney may sometimes be corrected at small expense by a sheet of metal carried across the top, four or five inches wide, folded over at the top, so that the flap will fasten in behind the brass frame and hold it in place. This serves as a curtain and prevents the smoke from puffing out in front at the top of the fire place. A more permanent and sightly arrangement will be to have the brass frame of the opening made wider at the top, or the tile-work may be carried down even after the brick-work has been finished, but it is well to experiment with metal of different widths until the proper height is ascertained.

A smoking fire-place is often caused by an 8-inch thick top to the opening or front of the fire-place. The brickwork crossing the top should be beveled back, so as to run from 4 inches thick at the front back and upwards. This might be secured by brick made $2\frac{1}{2}''$x12"x8" bevelled off from 4 inches at the bottom to 8 inches. The same effect may be secured by a brass hood for the frame beveled back so that the tendency of smoke and air will be upwards and without obstruction. Insist on having

your chimneys and fire-places built as per illustration on page 97.

It will be found true economy to have fire-places in all rooms where it is possible. They are not only desirable for heating the room in an emergency, but are valuable for purposes of ventilation. It is best to line them with fire-brick (or cast iron) and cheapest, also, in the end.

CHIMNEY BREASTS.

Where the chimney breast over the fire-place or mantel is "furred out" and finished with lath and plaster, as is sometimes the case, only metallic lathing should be used. It is well to fur out the breast with metallic lathing in this way in order that the paper of the room may be kept dry; otherwise on damp days, when the percentage of humidity in the atmosphere is high, the warm moist air of the room will condense on the cold chimney breast and, in time, injure the paper; so that furring out with metallic lathing, leaving an air space behind, will correct this fault.

Under no circumstances should there be any wooden furring or lathing on a chimney breast.

The specifications should provide for one joist or strip in the middle wall of every room, so that in case it is desired to hang a heavy mirror, a deer's head, an armor trophy or other object too heavy for picture moulding, this centre stud may be used for the purpose. (Remember, however, that no stud or other wood should be nearer to the inside of any smoke flue than eight inches. Four inches of brickwork even with terra cotta or cast-iron flue lining are not sufficient as a fire stop separation.) Builders and architects do not always think of such matters of detail and permit the joists to come where they will. It will be observed that in the accompanying specifications provision has been made for this simple but desirable feature. Anyone who has tried to find such a joist by sounding the plaster, only to discover that there is no

joist where it is most needed, will appreciate the value of this suggestion. Picture mouldings are not strong enough for heavy mirrors, etc.

In the case of chimney breasts the wooden stud must not be let into the brickwork, but must be secured with a tinned back so that it cannot be ignited.

MANTELS.

In selecting mantels, especially of wood, be sure to see that the projection of the mantel is not so great as to result in its being blistered, if not ignited, by the fire. This is a matter too commonly lost sight of. Not only will the mantel soon be ruined but there is great danger of fire. Two-thirds of the wooden mantels sold to-day have this serious fault.

PLASTERING.

The accompanying specifications will indicate the rules for lathing, etc. Metallic lathing, while it costs more than wooden lathing, is admirable to prevent passage of fire, and also passage of rats, mice and other vermin. There are several excellent kinds of patent plasters—King's Windsor Cement, Adamant, etc. These are mixed in the proper manner before coming to the ground and there is less danger of careless and ignorant work incident to the old fashioned plaster with cattle or goat's hair.

If metallic lathing be used for partitions instead of wooden lathing. greater safety will be secured. The rooms containing the larger values, such as the parlor, art-gallery, library, etc., could be made almost fire-proof* by metallic lathing, especially if the doors were made of ordinary pine covered with tin, which, in turn, could be veneered with ornamental woods and paneled so as to conceal the substantial protection beneath. It is well known to underwriters that an ordinary pine door covered with tin on both sides, the wooden frame

*The Japanese *Kura*, a fire-proof storehouse for valuables, into the construction of which not a particle of iron, stone or brick enters, is an illustration of what may be done by intelligent combination of such simple materials as ordinary clay and wood.

also being so covered, the tin being laid on with folded joints and nailed in the joints, so as to make a complete envelope for the wood, will resist fire much more thoroughly than an ordinary iron door, which costs more and is less effectual. Any carpenter can finish such a door with panels, etc., with ordinary beading, fancy mouldings, etc., so that, when painted, no one could tell the difference between such a fire-proof door and the ordinary kinds which yield so quickly to flame. Such a door might protect a valuable library or art gallery at an expense which would be merely nominal.

HEIGHT OF CEILINGS.

The ceilings of summer houses should be not less than 11 feet for the first story and 10 feet for bed-room stories, and ventilation is improved if windows are carried close to the ceilings, not forgetting, however, that the sills should come near enough to the floor (say within 32 inches) to enable anyone sitting in a rocking chair to look out easily. The bottom of the glass in the sash should not be higher from the floor than 34 inches.

HARD WOOD FINISH, WOODEN CEILINGS, ETC.

Probably few persons are aware of the increase in the number of fires resulting from the modern practice of constructing buildings, especially offices and dwelling houses, by substituting ornamental woods often yellow pine, with varnished surfaces for ordinary lath and plaster. The latter is a resistant of fire; the woodwork, as may be well understood, contributes to its ignition and to its spread. Moreover, the necessity of oiling the wood-work, from time to time, by servants ignorant of the dangers of spontaneous combustion, leads to many fires whose cause is never known or even suspected. It is natural for a servant to cast an oily rag after using it into some out-of-the-way place or rubbish barrel, where the conditions of confined air insure a sufficient rise in

temperature to cause spontaneous ignition. This is exceedingly liable in the case of linseed oil or of any of the vegetable oils, kerosene oil alone being free from the danger of spontaneous ignition, though dangerous enough in other respects.

It is bad enough where wooden ceilings are thoroughly backed up by plaster or mortar so as to prevent the draft incident to hollow spaces, but where, as is generally the case, the wooden ceiling is simply fastened to the wooden beams the construction is most dangerous and the progress of a fire exceedingly rapid, as in the case of the burning of the dwelling house of Hon. Benj. F. Tracy, Secretary of the Navy, in Washington, in 1890, in consequence of which Mrs. Tracy lost her life. In this instance not only were the dadoes and ceilings of ornamental woods, but the parlor walls themselves were finished in hard wood from floor to ceiling, with air spaces behind the panels. Notwithstanding that the fire caught, a few minutes before the breakfast hour in the morning, while men servants were actually at work in the adjoining dining-room, the spread of the flames was so rapid as to defy the efforts of the fire department to save life and property.

DOORS AND WINDOWS.

These, where economy is necessary, should be what are called "stock" sizes, *i. e.*, the regular sizes made by the mills of the vicinity in which the dwelling is to be located. To specify these will save the expense inseparable from unusual or irregular sizes. If, however, the house is so located as to have a fine view, it will be mistaken economy not to have one or more of the prominent windows wider and of plate glass. Even if the house is intended for a permanent home, sight should not be lost of the fact that it may prove necessary to sell it, and its commercial value will be increased by a much larger amount than the cost

of plate glass for the front windows or doors. Have plenty of windows. Architects sometimes omit them for effect.

Systematic examination of the plans and specifications should be made to see that there is uniformity in the height of the doors and windows, for want of uniformity will detract from the appearance of the dwelling. Indeed, it will be found that the only sure way to detect faults or oversights will be to make specific search through the plans for various features, one by one. If a general, cursory reading through of the plans and specifications is relied upon, something will be overlooked. A systematic examination should be made, therefore, to see that each of the different features of the building—height of windows, height of doors, doors to closets, etc., etc., is provided for, checking off each in the order of the suggestions herein contained, to see that nothing has been lost sight of. If they are not examined for, one at a time, something will be forgotten.

The accompanying specifications have been carefully drawn to insure that none of the points mentioned in this book shall be overlooked.

Windows opening on piazza. It is sometimes advisable to have windows which open on the piazza especially from the Dining Room, arranged in the form of sliding doors, running into the wall, on overhead tracks on trolleys. They are apt to leak unless opening on a piazza sufficiently wide to protect them; in fact, they should not be used on piazzas less than 12 feet in width. Folding windows which open like double doors are by some preferred to sliding windows. These are sometimes known as "French windows."

All bed-room doors should have transoms at least 12 inches high, of ground glass, with adjustable lever transom openers.

Some experts claim that it is a bad practice in stone buildings to build the window frames in with the stone masonry of the wall and that the openings should be carefully made, the stone wall being brought to a proper face, thoroughly pointed, and the window frames put in afterwards, if a weather-tight job is desired.

In planning windows and doors to bed-rooms, regard should be had to the importance of locating bedsteads and bureaus with reference to light and drafts, and windows should be arranged accordingly. It is sometimes discovered that the windows have been so injudiciously planned that there is no place for a bed to stand.

An easy way of planning for bedsteads, bureaus, etc., in rooms is to cut pieces of cardboard of the proper size according to the scale of the rooms. This is usually one-fourth inch to the foot. These pieces of card of the exact size of bedsteads, bureaus, buffets, etc., can be moved about on the architect's floor-plan of each room to determine the location of windows, doors, gas brackets, etc.

FLY SCREENS.

Fly and mosquito screens for windows and doors may be included in the carpenter's specifications, but it is usually best to have them put in by parties who make a specialty of this work. The copper wire netting, while most expensive, is the most durable.

STORM DOORS AND SHUTTERS.

If the dwelling is intended for summer occupation, to be closed during the winter, storm shutters should be made and estimated for when the estimate is taken for the house. Full details for storm shutters will be found in the accompanying specifications. It is customary to have small lights of glass in each to enable one to find his way through a closed house for inspection purposes. Be sure to make these water-tight.

CLOSETS.

These are indispensable for comfort and should be numerous. It is safe to assume that it is wise to sacrifice floor space of rooms for closets, for they secure not only comfort but order and neatness in the appearance of the house. The specifications should name the height and width of shelves, distance between them, size and arrangement of drawers, and should require hooks for hanging, which will cost little more if of brass or bronze instead of iron, and should be double. The door should not swing into a closet, thus doing away with half the hanging room, to say nothing of injury to the contents; and yet this is a common fault with some architects and builders. Closets are improved if ventilated by small windows wherever possible. Examine the plans to see that the hooks in closets for hanging clothing are at the proper height from the floor and that the shelves above the hooks start at a sufficient height above them to give room for removing garments. Any practical housekeeper will say that "a house cannot have too many closets."

MOTH-PROOF CLOSETS.

A closet for storing woolen blankets, clothing, etc., may be lined with camphor wood or with red cedar. This must be carefully tongued and grooved so that no cracks or joints are to be found anywhere.

It is best to ventilate all other closets with small windows or ventilators if possible, and especially the soiled clothes closets.

DINING-ROOM.

This room, as already stated, should be on the cool side of the house, and a space should be arranged for the buffet, so that it may receive either a side light or a front light from windows. It should not stand against a light window, with its back to the light, so to speak. Either a side light or a front light improves its appear-

ance materially. If the outlook from the dining-room is upon a beautiful view the window on this side should be wide and of plate glass, and it is advisable to have the window opening on a piazza either in the form of a sash door or a sliding window, running to the floor, of plate glass. The kitchen should not be too near to the dining-room. Where it is necessary to have the kitchen under the dining-room—and it never ought to be in a summer house—the floor should be cold-stopped and the flue should be entirely outside.

KITCHEN.

This should be so located as to get the prevailing breeze in summer, with thorough ventilation—doors and windows on all sides if possible. In order to better ventilate the kitchen the windows should be high, running as near to the ceiling as possible, as the hot air will pass out at this point; while the door should be low, to let in the outside and cooler air. The temperature will be improved and objectionable odors cut off from the living rooms of the house by the use of the "Heat and Odor Extinguisher," a hood which can be pulled down over the range so that any superfluous heat and bad odors will go up through the ventilating flue of the chimney. This ventilating flue should be provided for in the plans, and it will be found to be a very necessary feature. It will not add to the cost of the chimney when laying the bricks, as the bricks saved will offset the expense of arranging the flue. As much as twenty degrees of temperature will be saved on a hot day by these precautions, at slight expense; and it should be remembered that upon the health and comfort of the cook largely depend the comfort of the proprietor of the house and his family. Such simple precautions, therefore, are not merely humane, but wise from a selfish and economic standpoint.

If it is intended to have a bed-room over the kitchen (and it is advisable to avoid it) the floor should be deafened, with a ventilating space, to prevent the heat of the kitchen from making the bed-room unendurable. It would be well in such case, also, to construct the kitchen chimney entirely outside of the wall, so that it will not unduly heat the sleeping apartment.

The room over the kitchen would be better utilized for slop room, linen closet, trunk or luggage room and for drying clothes in rainy weather.

If the house is a summer house, to be kept closed through the winter, it will be advisable to hang the storm door of the kitchen on hinges, and have a Yale lock fitted on this and on the inside door both worked by the same key. The key of the Yale lock is conveniently small, and to have one key to both locks will be found a great convenience when visiting the house for inspection while closed.

BUTLER'S PANTRY.

This should be roomy. It should have an outside window and outside door, in order that its floor may be swept without sweeping either into the dining-room or the kitchen. It should also have a small door or slide window for passing dishes from the dining-room to the pantry, but this window should open into a closet on the dining-room side; see accompanying plan for cottage.

REFRIGERATOR.

This should be located so as to be handy to the butler's pantry and also to the kitchen and should be provided with a drip pipe to carry off the water from the melting ice outside of the building. It should under no circumstances, however, be connected with the sewer drain—a dangerous and highly objectionable arrangement. The better way is to connect it with drains which carry off the roof water, unless these pass into

the cistern, in which case it may be carried to some one of the surface gutters.

STORE-ROOM.

This should be arranged, if possible, between the butler's pantry and kitchen. It may be made rat and mouse proof at small expense by inserting small meshed galvanized wire netting in the plaster of the side walls and ceiling and between the double floors. A store-room thus constructed is like a rat-trap, with the decided advantage of having the rats and mice on the outside. The cost of this simple precaution will be only a few dollars. Do not neglect it.

BATH-ROOMS.

A thin layer of sheet lead under the upper floor of each bath-room, inclined to a small gutter of lead, to be run through the outer wall of the building, with raised door sills, would prevent any overflow of a bath-tub from injuring the building, although a double floor such as I have described, with Salamander between, would probably be sufficiently water-proof to insure that any surplus water would be safely carried outside of the walls. The overflow pipe of the bath-tub, however, and of the wash-basin should be of sufficient size to carry off the combined flow of the hot and cold water faucets without other precautions being necessary. This important matter is often neglected by plumbers to save expense in the size of pipe.

Porcelain-lined or enameled iron tubs have grown to be not merely a luxury, but a necessity, and will prove most economical in the long run. Those with roll (enameled) rims are generally regarded as preferable. I prefer the wooden rims, on account of their not being so cold or slippery—but I find I am in the minority.

Enameled iron tubs as they come from the manufactory, are not painted on the outside, and the painting

specifications should provide that two coats of best enamel paint are to be given to the outside of all enamel bath tubs. This will not cost over $2 apiece, but if included in the specifications when estimates are taken it may not add anything to the cost, whereas if omitted and contracted for afterwards it certainly will.

A small gold-leaf streak around the side near the top of the bath-tub is a neat and inexpensive ornament.

The latest form of bath tub is without faucets, the water being admitted near the bottom of the tub, to prevent the drawing of water in buckets, pitchers and other vessels by servants, a practice which endangers the enamel of the tub. It is better, however, to have the faucets supply the tub from the top, as the temperature of the water can then be arranged more easily while the tub is filling. Where the supply is at the bottom it is impossible to tell at what temperature the water is running after it is three or four inches in depth. The initial temperature is seldom that of five minutes later, the hot water always running hotter and the cold water sometimes running colder. Side lever faucets are preferable to screw faucets.

Bath-rooms should be wainscoted to a height of four feet. Tiling is preferable, but costs more money than plain yellow pine varnished which is less expensive than other woods and makes a good finish.

Of course, a bath-room wainscoted with tile or marble, and with a tile floor, is preferable to all others, but it is much more expensive. A neat wainscot may be made of King's Windsor Cement, which is somewhat cheaper than one made of Keene's Cement. Both are safer than wooden wainscots on account of fire. If either of these two substitutes for tile is used give it two coats of white lead paint and one coat of zinc paint; the latter prevents the sulphur from turning the white lead yellow.

If the bath-room is tiled, two small gold tile beads, one above and the other below any ornamental frieze, make a neat and handsome finish. Do not put the gold near the floor tile, however; at that point it will look more like a defective joint of brown mortar than like gold.

If the owner can afford it he should provide a bath-room for the servants.

A friendly critic suggests that water-closets and bath-rooms should be separated. I do not agree with him, but mention the fact in case others may.

TOILET-ROOM ON FIRST FLOOR.

A toilet-room on the first floor, with water-closet and lavatory, is a great comfort and convenience and can generally be arranged under the main staircase of the hall, in connection with a coat closet, as shown on the accompanying plans. In this case the closet is under a bath-room and a more economical arrangement of piping is possible. Be sure to have a window in it.

LINEN CLOSET.

This is an important feature in the economy of a good housewife and almost indispensable to her comfort and convenience. It should be of liberal size and, if possible, should be so located as to have an outside window and be be free from dampness.

SEWING ROOM.

It is advisable to arrange a small room with an outside window, well ventilated, as a sewing room, where the sewing machine can stand and the seamstress can work to advantage. In the accompanying plan for a cottage the hall on second floor, with bay window, makes an excellent sewing room.

SLOP CLOSET.

A slop closet, with galvanized iron water sink (a strong one of enameled iron is preferable) and a pipe of good capacity, is a desirable addition on every floor. It will be

a convenient place for brooms, brushes, etc., and forms an important safety-valve for the water closets, which will otherwise be used for emptying slops by careless servants.

Owing to the negligence of servants in not properly flushing slop closets, they ought really to be arranged in the same manner as a toilet closet, so that a chain would need to be pulled in order to get water for rinsing vessels, and so flush the trap automatically at the same time. It is very important that slop closets should be ventilated with an outside window.

LUGGAGE OR TRUNK ROOM.

It is very desirable to set aside one room, not above the second story if possible, for a luggage or trunk room. The room over the kitchen is generally a warm room and can best be spared for this purpose. This room may also be utilized for drying clothes on rainy days by having strong hooks fastened to the studs for attaching the clothes-lines. The room need not be plastered, and where the kitchen is in an extension it is wise to make the extension two stories, so as to insure a slop room, linen closet and trunk or luggage room.

STAIRCASES.

These should always be wide, not less than three feet six inches in the clear; four feet is better for the rear staircases—the front or main staircase should be wider. The risers should not exceed seven inches, (better $6\frac{1}{2}''$) to insure easy stepping, and the treads should not be less than ten inches in width, excluding the "nosing," or projection of the step over the riser below. For rear staircases nine inches width of tread with $7''$ riser will answer. It is important to build the rear staircases wide enough to carry up furniture, trunks, etc., and so relieve the front and more ornamental staircases from injury and undue strains. It will not add materially to the expense of the building where contemplated in the estimate of builders and will prove a lasting comfort and satisfaction.

It is unnecessary to suggest that if the staircases are wide the doors at the foot and head of the stairs should correspond in width; otherwise the advantage of a wide staircase is largely lost.

Under all stairs there should be a centre carriage timber to stiffen them when heavy weights are being carried over them, and also a carriage timber inside of the front or unsupported string, and they should be strongly bracketed underneath every step, unless the unsupported string is itself 3"x8." It is not safe to rely upon the strength of the stringers or side pieces only.

Staircases of wood may be rendered practically fire-resisting if the spaces between stringers or carriages, lower joists of landings, etc., are "pugged" solid with mortar or other incombustible material and the spaces between stringers closed, at intervals of three feet, by fire-stops of such material.

HEATING.

This may be by hot water, steam or furnace. For summer houses a furnace is preferable, because of the readiness with which the temperature can be raised on a cold morning or evening, often when it is desirable to let the fire out during the middle of the day. By use of a few sticks of wood, the temperature of dressing-rooms can be changed in a few moments in the morning.

The furnace should be a large one. It is better to force a large volume of warm air into a house than a small volume of very hot air.

Where the heating pipes pass through hollow partitions or between the floors they should be double, an inner and outer pipe, with an air space of at least half an inch between the two. These are required by the New York Building Law. If they pass through such partitions within fifteen feet of the furnace it would be better to wrap them with $\frac{1}{4}$ inch asbestos board.

The accompanying specifications require the separation of studs between which the hot air pipes of the furnace pass so as to allow three inches of space. This is very important. They also provide that the lathing over hot air pipes shall be of metal. This costs little more and may save a midnight fire. If the partition or side walls of the building are of brick or stone the hot air pipes of the furnace should be carried up in the wall as it is built. This, of course, is the safest of all construction.

It will be observed that in the accompanying carpenter's specifications, as well as in the furnace specifications, provision is made for the separation of the joists. This is necessary to prevent oversight. Probably no important matter connected with construction is more generally overlooked by builders, architects and others than this important one as to the carrying of hot air furnace pipes throughout the building.

THE COLD-AIR BOX which supplies the furnace should be of metal; galvanized iron with soldered joints is the best. Not only is this advisable on account of the danger from fire, but to insure that the poisonous air of the cellar, from wet coal, decaying vegetables, etc., etc., is not pumped through the living rooms of the house, as it will be if a wooden cold-air box is used. Wood is apt to shrink and open seams or cracks with seasoning, changes of temperature, etc., etc.

Provision should be made for evaporating water in the air chamber, so as to moisten the air forced through the house. Most furnaces are provided with an evaporating vessel. It is a generally accepted but mistaken belief that furnace heat is necessarily a dry heat, and that steam and hot water systems necessarily afford moist heat. The names of the two systems suggest the idea, but there is no other foundation for it. In neither of the two can steam or hot water get out of the pipes, which are of

course water-tight. Even where provision is made for permitting steam to escape at the valves, the valves are seldom opened and when they are the odor of escaping steam is disagreeable; while, on the other hand, a good large furnace, forcing a large volume of warm, fresh air, instead of a small quantity of hot air, throughout the house, by means of an air-tight, galvanized iron cold-air box, with hot water evaporating in the air chamber, insures moist temperature, and at the same time better ventilation than either the hot water or steam systems, which simply heat the air already in the rooms. Where, however, volumes of fresh air are forced over heating surfaces of steam pipes or hot water pipes the case may be different; but where reliance is placed on heating the air already in a room simply by steam or hot water in stationary radiators, and no provision is made for a continued circulation and supply, the hot air furnace is preferable. In the case of a summer residence, especially, which needs artificial heat only for a few mornings or evenings in the spring or autumn it will be found the most convenient and economical.

The sides and top of all brick hot air furnaces should be kept at least four inches from beams, girders or wooden partitions of any kind. The walls of brick furnaces should be built hollow, with a space of four inches between the inner and outer wall. All portable hot air furnaces should be kept at least two feet from any wooden or combustible partitions, or ceilings, whether the same be plastered or not. A suspended metal shield above the furnace costs little and is an admirable precaution. It should be so arranged as to be easily cleaned as combustible material may collect on top.

The principal register of a furnace should always be so secured that it cannot be closed, in order to prevent an accumulation of hot air and super-heating. A floor register should never be placed directly over a furnace.

LIGHTING.

It will be wise to provide for electric light wires and gas pipes when constructing the building if there is the slightest probability of either gas or electricity becoming available in the near future. It is perfectly safe and practicable to manufacture gas on the premises, from gasolene, the tank or gasolene holder being outside and underground, and the air-pump or regulator, so constructed as to be gas and air proof, in the cellar, in a light place, with a vent gas pipe running outside, so that any back pressure from the tank would force any leaking gas outside of the building. The Springfield Gas Machine, constructed on these principles, is safer than ordinary kerosene lamps—quite as safe, in fact, as city gas. Beyond the initial cost of the plant, the cost of gas so manufactured is almost nominal, while the gas is so far preferable to lamps that it will add materially to the comfort and convenience of the family.

GAS AND ELECTRIC LIGHT OUTLETS.

These should be carefully planned with reference to bureaus, bedsteads, etc., in bed-rooms, and reading desks and tables in library, etc. Expense can be saved by dispensing with centre outlets for chandeliers in bed-rooms, using side brackets only; but in view of the fact that any house may some day be offered for sale, and the further fact that it costs little to extend pipes and wires for centre outlets of chandeliers, it may be wise to provide for them, as they might be desired by a purchaser.

All electric installations should be in accordance with the rules of the Underwriters, as these are kept constantly corrected to be in line with the latest discoveries in precautions for safety. Conduits or raceways for carrying the wires through the house should be of iron or other metal, in order that the wires may be easily withdrawn, repaired and replaced, and in order that the danger of fire may be minimized.

PUMPING.

The forcing of water to the tank will be most economically performed, as a rule, by a Rider hot air engine. This may be run by gas, where gas is procurable, or by the use of coal, requiring little more attention than a small stove.

A good wind-mill is also an economical appliance for country houses.

WATER TANK.

This, if it is necessary to have it in the house, as is generally the case, should be strongly supported by the arrangement of the timbers beneath it. It should be of iron, or if of wood, lined with tinned copper, and care should be taken to see that the overflow pipe is of sufficient capacity to prevent damage to the building. An expansion pipe should be provided, opening into the tank, to relieve any undue pressure on the pipe system.

The overflow from tank should be so arranged as to return the water when the tank is full to the cistern, thus saving the water and aerating it, it being a great advantage to the water in the cistern to have it aerated in this way. The tank room should be thoroughly ventilated.

Make the tank large enough—a cubic foot of water is equal to 7.48 U. S. gallons and the capacity of the tank can be estimated with knowledge of this fact.

It will be found a wise precaution to paint the timber work of the attic where the tank is located, as well as the outside of the tank itself, with a good quality of fire-proof paint. That made by the H. W. Johns Manufacturing Company is a good article. Where the expense is objected to, whitewash may be used, with some common table salt added. This will tend to make the wood-work less ignitable. Dry unprotected wood (and it is always dry in an attic) is easily ignited and fire flashes quickly over its surface. Plumbers are frequently inexcusably

careless with their fire-pots, and the simple and inexpensive precautions suggested may prevent the rapid spread of a fire and the destruction of the building.

ELECTRIC BELLS.

These should be carefully planned with reference to convenience in using. It is well to have an electric bell to the servants' bed-rooms, as well as to the kitchen, near the head of the bed of the mistress of the house; one also from the reclining couch or divan in the library or sitting-room, and one from the table in the dining-room. This latter may be arranged by a flexible cord carried to the chair of the proprietress; also with a button in the floor, to press with the foot. A bell to the stable, with a push button in both the bed-room of the proprietress and the library is also desirable.

Speaking trumpets from owner's bed-room to kitchen and furnace in cellar are advisable. The latter will enable owner to instruct the man at the furnace as to the amount of fire especially when he hears him throwing in coal early in the morning.

Where electricians are not handy pneumatic or pull bells are preferable to electric bells.

HARDWARE.

As a rule, it is a mistake to economize in the selection of hardware, especially in the matter of door knobs, locks, escutcheons, etc. These cost little more if of brass or bronze than if of iron. Knobs, for bed-rooms especially, are much neater if of wood. The round knobs are preferable. Inasmuch as the builder will be sure to estimate full price for finishing hardware, it is better to except this and provide that the owner will furnish it, being careful, however, to specify just what hardware the owner is to furnish, as otherwise misunderstandings are certain to arise. It is only necessary to specify that the owner will furnish all locks, knobs, hinges, sash lifts and

sash fasteners, the builder to furnish all other hardware. This will enable the owner to exercise his taste in that portion of the hardware for which he may be supposed to have preferences.

SASH WEIGHTS AND CORDS.

Metal chain will be much cheaper in the long run, especially for heavy windows, than sash cords, no matter how good the latter may be. Where sash weights exceed twenty pounds they should be of lead, which will cost about five cents a pound as compared with one cent for iron, but it is worth the difference, as heavy iron weights are clumsy and necessitate larger window boxes. The axle pulleys should be not less than $2\frac{1}{2}''$ wheels with flat bottom channels or grooves.

TRIM OR FINISH.

The owner should require the architect to furnish details of the trim (by which is meant the wood finish, window frames, door frames, wash or base boards, panels under windows, wainscoting, etc.) promptly; in fact, simultaneously with the plans and other specifications, in order that the builder may have no excuse for not having all of the trim kiln dried in time for finishing the building.

This is a more important matter than, at first glance, it may appear to be. Builders and contractors are often prevented from finishing their work in time through the negligence of architects in furnishing details, drawings, etc., and do not like to put the blame where it belongs; no builder likes to quarrel with an influential architect. In the accompanying contract with the architect this has been provided for, and the owner should see that all of the working plans, details, drawings, etc., are fully completed before taking an estimate for the work. He will thus get better prices, because each contractor will know exactly what he has to do and will not make undue allow-

ance for construction details as to which he may have to guess. Moreover, as already stated, it is vitally important to have the details of all standing trim at the earliest moment, so that it may be properly kiln-dried or seasoned.

The owner, too, will find it advisable to go over the drawings of the standing trim, doors, etc., patterns of the main staircase especially, as in case they do not suit him it will be too late to remedy the matter after they have been prepared and brought to the building.

Do not under any circumstances consent to have your architect take estimates with the indefinite clause "details hereafter to be furnished."

Plenty of time should be given to the various contractors estimating to make their figures, and money will be lost if they are required to estimate without sufficient time for investigation—at least a week in any case.

PAINTING.

It will be found that a pleasing, cheerful and inexpensive finish will be a trim of ordinary natural finish white pine,* treated with one coat of pure spirit shellac white, rubbed down with oo sand-paper, to have two coats of Murphy's wood varnish, neatly rubbed down with pumice stone and water to a smooth dead finish. All of the main

*An expert friend of mine of great experience in the erection of buildings, who has, also, built two dwellings for himself, writes me as follows:

"Yellow pine, if carefully selected and treated, makes a beautiful trim for a house inside. It should be applied as a veneer to white pine. I find one coat of oil best; then let it stand for a year or two; then give it another coat; then, when it has become dark and rich in color, finish it in any way you like, wax or varnish rubbed down. Of course this can all be done when the house is occupied."

I prefer the light and cheerful color of white pine, but some of my readers, like my friend, may prefer the darker wood. The whole question of wooden trim and top flooring is one which each must settle for his own taste, not overlooking the dangers of *wooden ceilings* and dadoes already explained. See page 40.

stairs, main hall, library, drawing-room and dining-room floors should be finished with filler and two coats of Murphy's floor varnish. All hard wood should be treated the same as pine, except that it should have a coat of Wheeler's filler and an extra coat of varnish.

All exterior woodwork except shingles should have two coats of white lead and oil paint. If it is intended to have the shingles "weather gray" a dark green paint on the cornice, blinds, etc., blends well with it and gives a rich attractive effect.

All tin and galvanized iron work should have two coats of best metallic paint, and the ceiling of piazzas and porches, front vestibule doors and piazza columns (if the latter are of natural wood) should be finished with a coat of filler and two coats of Crockett's or Pratt's spar varnish. A very satisfactory effect in the piazza is to have the columns of Georgia pine twelve inches in diameter. If the house is a large one these will be in keeping, rather than to have columns built up square of boards, or solid turned columns of smaller size.

BUILDING DEPARTMENT.

Where the building to be erected is within the jurisdiction of a municipal or State Building Department it is best to have the plans approved by the department before awarding the contract. This precaution will cost nothing, and may save charges for extra work. If such a clause as the following—"all work must be done in accordance with the requirements of the Department of Buildings, and any changes in the work made by the order of said Department will form a part of this contract and will be done by the contractor without cost to the owner"—is relied upon to protect the owner he may rest assured that the contractor will make due allowance in his estimate price for all possibilities and take the benefit of any doubt, when in fact there need be no doubt.

LIGHTNING RODS.

Probably no important question connected with dwelling houses is the subject of greater diversity of opinion than that of whether or not lightning rods are necessary. That it is advisable to have a good lightning rod, well grounded, *i. e.*, connected with moist ground, is the generally accepted opinion of those who ought to be best informed on the subject. I am fully aware that lightning rods are regarded by a large number of people as affording no protection; indeed, a gentleman who has favored me with many valuable suggestions in the review of the proof of this book, insists that a dwelling of his destroyed by fire, as a consequence of being struck by lightning, was rodded in the best manner. Notwithstanding his opinion, I advise everyone to have a good lightning rod, and to supplement its protection with a fire insurance policy in a reliable insurance company. The Washington Monument was repeatedly struck and injured until it had been protected with a rod, and though repeatedly struck afterwards no damage was done.

The advantage of lightning rods, however, is not confined to the conducting away of strokes of lightning. They frequently, so to speak, tap the electricity in the atmosphere and conduct it quietly away to the ground, preventing its accumulation in sufficient volume for a stroke. For this reason, the lightning rod should have numerous points on the roof. It is a well known fact that beech trees are seldom struck by lightning, whereas oaks, hemlocks and other trees are subject to frequent damage; and while this well known fact is accounted for on the supposition that the rougher barks hold water, itself a good conductor, and that oak contains a great deal of iron in its composition, the exemption of the beech tree is believed by many to be due to the fact that it has numerous *pointed leaves* and twigs as well as a smooth bark.

The lightning rod may be of iron or copper and may be in the simple form of a hollow gas pipe or in twisted wire cables, or it may be in a flat or taped surface. It is the surface which conducts the electricity, rather than the centre or solid portion of the rod. Ordinary gas pipe three-quarters of an inch in diameter will make an excellent conductor. It may be fastened to the wooden sides of the wall or to the roof by strong iron staples. It is not necessary, although it is customary, to insert glass insulators, because the current will not leave the rod to enter woodwork, or forsake a good conductor for a poor one. The rod should be carried deep enough under the surface of the ground to reach moist soil. An excellent ground is secured by connecting the bottom of the rod by copper wires, well soldered, to the pump rod entering the water in the well.

The writer would advise all persons erecting dwellings in isolated locations to have rods. In cities they are not necessary. Continuous use of tin or other metal for roofs, water pipes connected with the underground system of the city or drain pipes with the sewers are sufficiently good conductors to make rods unnecessary. Indeed, even in country dwellings, if leaders and gutters are connected with the points of the rod on the roof they form sufficient channels for carrying the electricity or lightning to the ground, provided they are connected with moist ground or with the pump rod in the well.

A poor rod, or one not properly connected with moist ground or disconnected at points is worse than none.

CISTERNS.

Only Portland Cement mortar should be used in cisterns. The bottom or foundation, unless constructed as an inverted arch of brick, like the bottom of a flask, should be of best concrete, 12 inches thick, one part cement, two parts sharp sand and four parts clean, well

washed gravel or clean broken stone. The side walls built as per specifications, page 100. If the cistern is filled by pumping from a well, it is better to have the water pumped into the top, as this aerates the water. The top should be arranged to secure perfect ventilation.

The capacity of the cistern is an important matter, and may be easily computed by the following table:

CAPACITY OF CISTERNS OR TANKS, IN U. S. GALLONS,

For each 12 inches of depth.

The following table will enable any one to estimate the capacity of tanks or cisterns of cylindrical form, in U. S. gallons for each 12 inches of depth:

4 feet diameter,	94	11 feet diameter,	711
5 " "	147	12 " "	846
6 " "	211½	13 " "	993
7 " "	288	14 " "	1115½
8 " "	376	15 " "	1322
9 " "	476	20 " "	2350
10 " "	587½	25 " "	3672

For example, a cistern 25 feet in diameter would contain 3672 gallons for every foot of depth; and if 10 feet deep, 36720 gallons, or 918 bbls.

A simple rule may be stated as follows: To find the contents in U. S. standard gallons *for each foot of depth* of a cylindrical cistern with a circular base, *multiply the square of the diameter (in feet) by* $5\frac{7}{8}$*; the product will be the contents in gallons.**

For example, a cistern 20 feet in diameter and 10 feet deep would contain $20\times20\times5\frac{7}{8}\times10=23500$ gallons (see table above).

CONTRACTORS.

Let no one persuade you to make separate contracts with various contractors—builder, plumber, mason, etc. Unless there is one responsible contractor for the whole work, each of the contractors will plead negligence on the part of one or more of the rest as an excuse for delays. The builder will insist that the mason did not get his

*The cubic contents in feet of a cylinder like a cistern are obtained by multiplying the area of the circle by the depth in feet. Inasmuch as the area of a circle is obtained by multiplying the square of the diameter by .7854, and inasmuch as a cubic foot of water contains 7.48 gallons, it is only necessary to multiply the square of the diameter by the product of 7.48 X .7854, = $5\frac{7}{8}$, to obtain the result in gallons, without the longer computation.

foundations finished in time; the plasterer will insist that the roofer did not finish in time for him to commence his work with necessary protection against the weather, etc., etc. Moreover—and this is a serious matter—any injury to the building by reason of neglect to protect against the elements will be a matter for which an owner who has various contractors, will alone be responsible, whereas if he has one contractor, under obligation to finish and deliver the building in good condition he will be relieved of protecting the building from storms, washouts, etc., and will also be relieved of the expense of paying watchmen for nights and holidays.

It ought to be unnecessary to suggest that it is important to investigate the reputation of contractors and architects as to fidelity of performance before making contracts. Do not be satisfied with writing letters to parties who have employed them, but go in person; only in this way can confidential and important information be secured. It is very important to secure honest men. It is impossible to watch all details and secure conformity to the specifications if the builder is tricky. As already stated (page 8) it is well to employ an inspector for supervision. He will save his wages.

EXTRAS.

If it is desired to keep check upon all charges for extras and the architect is not thoroughly reliable, the contract should stipulate that no changes in the plans shall be made nor any extra work done unless upon written certificate of the architect *and* owner (not "architect or owner," the prevailing phrase)

MECHANICS' LIENS, ATTACHMENTS, ETC.

These can be avoided only by taking proper precautions. Much depends on the law of the State. In some States, New Jersey, for example, the law requires that a copy of the contract and of the specifications shall

be filed with the County Clerk, and that this having been done, the owner will be liable only for payments made to contractors after having received written notice of liens; so that, in the absence of written notice, he is safe to make payments.

PER DIEM PENALTIES FOR FAILURE TO COMPLETE WITHIN TIME OF CONTRACT.

These are practically uncollectible. They cannot be enforced as a rule, because of pleas, which juries will consider, of exceptionally unfavorable weather, alterations in plans in matters of afterthought; delays of sub-contractors, etc., etc. It almost invariably happens that some slight change is desired in the plans—an extra door or window, for example—and any change is liable to defeat a claim for damages. The best way to enforce a penalty is by means of a bonus, making the contract for something less than the agreed price, the difference to be paid as a bonus if completed within the agreed time. For example, if a builder is willing to contract to finish a $5,000 building by the first of June and to pay a penalty of $25 per day for each day of delay after that date, he cannot consistently object to making his contract for $4,250 if finished by the first of July, with the agreement that he is to receive a bonus of $750 if he finishes it by the first of June, the desired date, the bonus to be computed at the rate of $25 per day for each day of earlier completion than the first of July. He will thus receive $750 bonus, or $5,000, his actual contract price, if he finishes the building within the proper period. Such a contract can be enforced, because failure to complete will clearly deprive him of his right to the bonus.

INSURE YOUR HOUSE AGAINST LOSS BY FIRE, LIGHTNING, TORNADOES AND WIND-STORMS.

From the moment you begin to use combustible material in your house and get beyond the foundations it

should be insured in some reliable Company. Dwelling houses are liable to burn from many causes—unscrupulous enemies, tramps, insane persons and other incendiaries. Rats, mice and roaches cause fires by gnawing the ends of matches or by carrying greasy and ignitable substances near flues, hot furnace or steam pipes. Tinners and plumbers are sometimes careless as to their fire-pots on roofs or in dry attics. Painters leave oily rags or oily overalls where they are liable to ignite spontaneously. Kerosene lamps are liable to explode or to be dropped and broken while lighted. Children often cause fires in playing with matches. Nearly ten per cent of the total number of fires are caused by lightning; one fifth, or fully twenty per cent, are caused by defective flues; not a few are due to sparks alighting on shingle roofs and the burning out of soot in chimneys; many are caused by curtains or other drapery blown by currents of air from open windows or doors into burning gas jets or open fireplaces. Hot ashes in wooden boxes or barrels cause many fires. Wood ashes particularly are liable to heat even after they are supposed to be cold and to ignite wooden receptacles containing them. Clothes hung near stoves or ranges to dry sometimes fall or are blown upon the fire and ignite. In fact, no person having access to the statistics of a Fire Insurance Company and brought face to face with the hundreds of ways in which fires originate would be willing to insure himself in order to save the small sum of money for which an insurance company can afford to insure by doing a wholesale business and collecting the premiums from thousands of property-owners. Do not carry the risk yourself. When you find how small a sum it will cost you annually to insure, you will need only to multiply it by the number of years it would take you to accumulate a sufficient amount to pay a loss (not forgetting that the loss may come the

first year) to demonstrate how foolish it would be for you to carry the risk yourself. No matter how well off you may be, it is very convenient, in case of a fire, to find the money ready to your hand for rebuilding.

During construction the builder may have an interest as well as yourself and the insurance policy should be issued in the name of both, as follows: "John Doe, as owner, and Richard Roe, as builder; loss, if any, payable as interest may appear."

When the house is finished and furnished, your wife should be joined in the policy, inasmuch as she will own property in it, as well as yourself, and this joint insurance will save both interests. The policy, therefore, should run to "John Doe and Mary, his Wife."

Select an Insurance Company which has a substantial Net Surplus. Good management as well as capital is a requisite of safety in an insurance company, and a substantial net surplus is one of the best evidences of good management. *Insure with an American Company.*

SAMPLE PLANS FOR A COTTAGE.

The following plans are of a summer cottage on a hillside fronting upon an ocean view. The prevailing summer wind blows towards the dining-room which, for that reason, is located with reference to the fact.

It will be observed that the dining-room communicates with the butler's pantry both by a full sized door and by an opening with small sliding door from a closet, for passing dishes. It will be observed also that the butler's pantry is of commodious size, and that it has a window at one end and a door at the other, so that its floor may be swept without sweeping either into the kitchen or dining-room.

The store-room is located, as it should be, between the kitchen and butler's pantry and dining-room. It is lined in the plastering on sides, overhead and between floors

with galvanized wire netting $\frac{1}{8}$" mesh and is rat, mouse and vermin proof.

The rear stairs are three feet six inches wide in the clear.

The kitchen and laundry, although separate, are so arranged as to assist in ventilating each other, thus practically increasing the size of both.

The main hall which is in the centre, as it should be in summer houses, is sixteen feet wide, and the doors from the parlor, library and dining-room opening into it are double sliding doors. The effect is not only to make the house cooler, but more roomy in appearance.

The library is arranged with a large projecting plate-glass window five feet in width, giving a view upon the ocean, and at the same time affording the observer a full view of the fire-place, which, with its wood fire, would share his attention in stormy weather—the only time in summer when he would probably not be on the piazza. It will be observed that the corner opposite the plate-glass window has not been rounded with a bay-window, but left square; this is for a divan or lounging couch, with pillows.

It will be observed that there is a toilet room with water closet and lavatory on this floor under the main staircase. (See page 49.)

The plan of the second floor has some of the features of the first, including the wide hall through the centre.

The projection of the middle front room over the piazza below is to insure that this room shall have two side windows, which it secures by this simple provision. Otherwise, like most middle rooms, it would not be properly ventilated for warm nights. This is an important feature for a summer house.

The two bed-rooms on the northerly side of the house secure the prevailing breezes from the hall, with its bay-

window, on the southerly side, in the rear of the front bed-room. This hall forms an admirable sewing room where the seamstress has plenty of air and light from the bay-window and it is always cool in summer. It will be observed that the staircase to the third or servants' floor does not ascend from this floor. It is a rear staircase. This insures the more thorough ventilation of the second floor, as a staircase running to the third would cut off breezes from the northerly bed-rooms. It also insures immunity from the noise inseparable from the servants' quarters and their early rising.

It will be observed that closets have been liberally provided, and that they are of generous size.

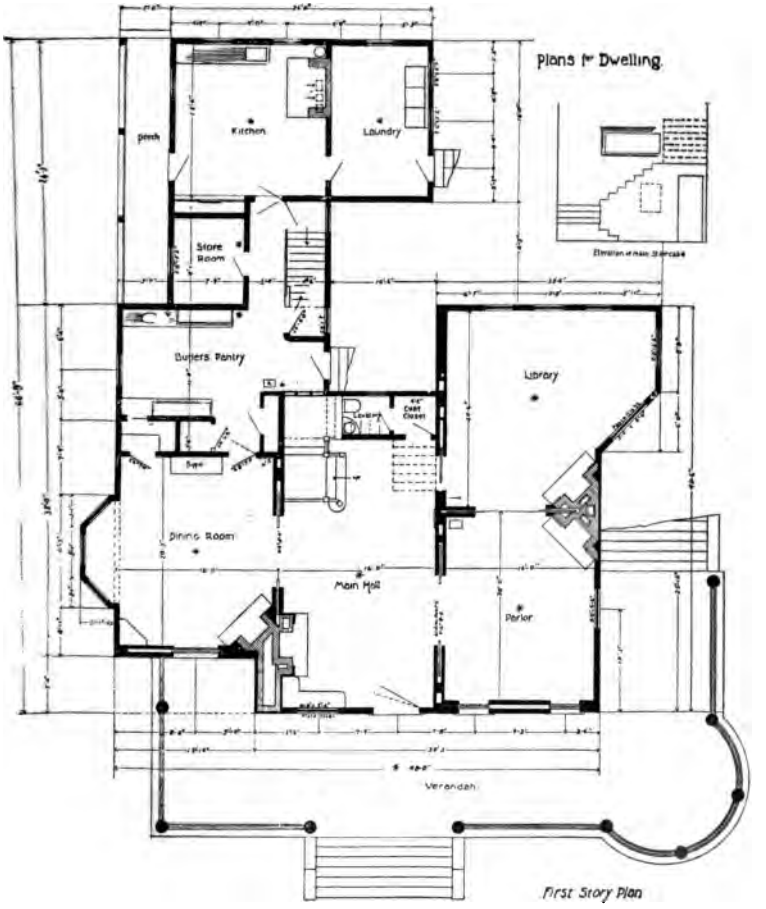
Each room has a fire-place.

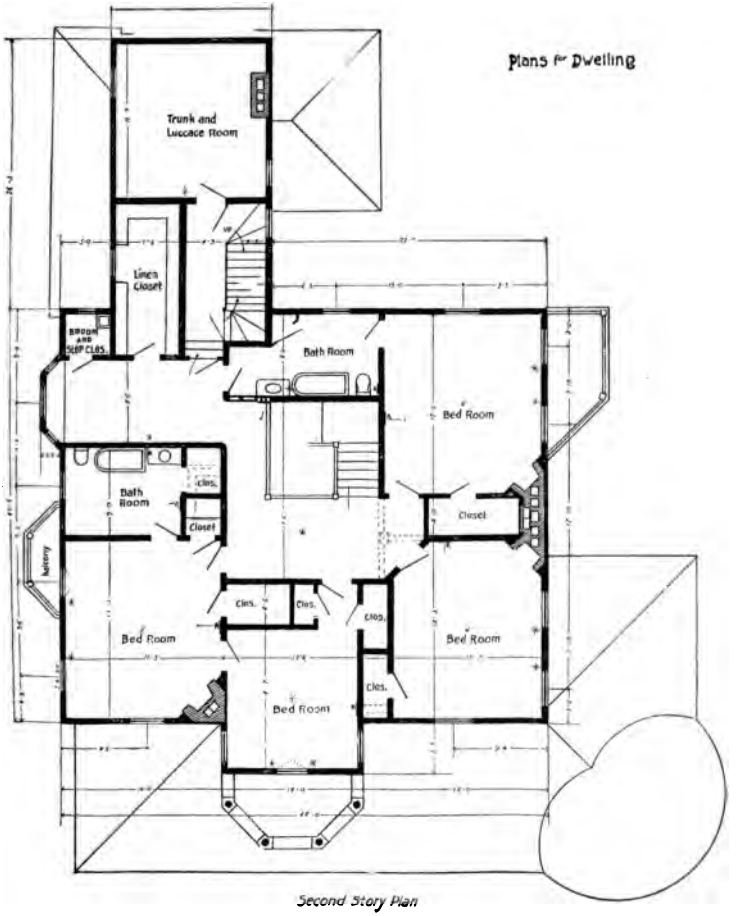
The linen closet and slop closet are important features.

The two bath-rooms on the second floor can be connected each with its bed-room, so that the spare room has a separate bath-room into which it opens.

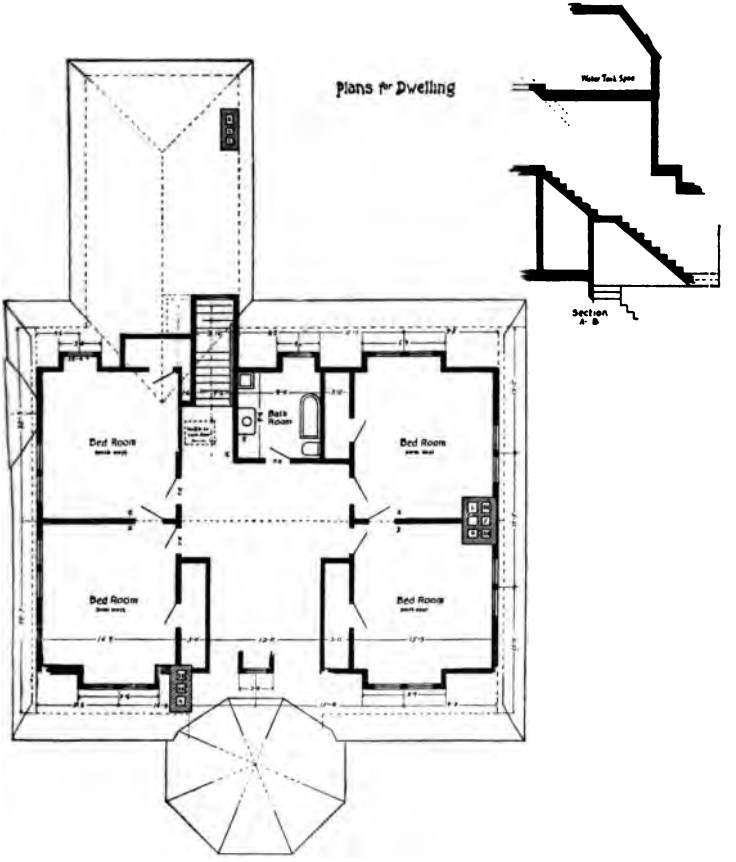
All important windows opening upon the view are wide and of plate-glass.

The house is built of cedar shingles, allowed to become "weather gray;" slate roof, "Pennsylvania" 9x18 slates; walls back plastered; floors double with Salamander between. The floor beams are all of them 3x12; piazzas 12 feet wide, the piazza pillars 12 inches in diameter, Georgia pine, natural finish. The entire trim of the house is of plain white pine, finished with shellac, except the main staircase, which is quarter sawn oak. All flues are surrounded by 8 inches of brick-work and in addition are lined with burnt clay pipe and all hollow partitions have "firestops." Metallic lathing on cellar and main ceilings forms admirable fire-stops and prevents incursions of vermin.


Plans for Dwelling
Porch
Kitchen
Laundry
Store Room
Butlers Pantry
Library
Dining Room
Main Hall
Parlor
Verandah
First Story Plan



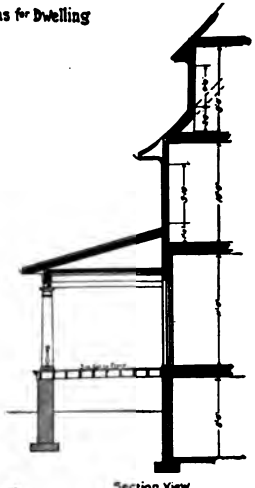
Second Story Plan



Third Story Plan.

Plans for Dwelling

Front Elevation



Section View

Perspective Front Elevation.

Main Hall.-Looking into Dining Room.

SAMPLE SPECIFICATIONS.

The following specifications can be used for separate contractors or, as already recommended, for one contractor for the whole work and, with slight modification, can be adapted to any kind of a building. Most of the requirements, especially those as to standing trim, flooring, etc., would be identical with those needed for mercantile or other occupancy. They call for the best forms of construction, in the belief that they should be so drawn in order that anyone desiring to build after the most approved methods would be enabled to secure his wish, it being much easier to modify specifications to suit cheaper construction than to change phraseology intended for a simple and cheap building so as to provide for more elaborate and expensive construction.

HOW TO BUILD A CHEAPER DWELLING.

If, therefore, the reader desires to construct a cheaper dwelling than is here provided for, he can, especially with the assistance of his architect or builder, go over the specifications, paragraph by paragraph, and strike out

such requirements as he may be willing to dispense with. He can, for example, have a narrower hall than 16 feet in width; he can have one common chimney for the entire house, to save the expense of separate stacks and fireplaces, dispensing, if he chooses, with all fireplaces except that in the library or living room, where an open fireplace is generally too much of a comfort and luxury to be dispensed with. He may arrange for one bath-room. He can substitute zinc, tin or galvanized iron flashing for copper (although he will do well to inquire the extra cost of copper, which is cheaper now than it used to be, before deciding.) He can substitute ordinary white pine flooring or North Carolina pine for comb grain yellow pine, especially if his floors are to be entirely covered with carpets or matting. He can omit the requirement that risers and treads of staircases shall be plowed or tongued into each other. He ought not to omit the carriage timber. He can substitute plain boxed columns, to be painted, for his piazza instead of solid wood columns. If he decides upon a cheaper wood for his floor beams than yellow pine, he should take white pine, spruce or hemlock, in the order named; the latter is the poorest of all for the purpose. But unless his house is to be a small one and the spans of his floor beams are to be less than 15 feet, he will make a serious mistake if he consents to 2"x10" floor beams instead of 3"x10" or 3"x12." In small houses it is quite customary to put 2"x12" floor beams for the first story, 2"x10" for the second and 2"x8" for the third. Under no circumstances should a chimney rest upon such beams as these, nor, for that matter, upon any floor beams, no matter how large; all chimneys should be built from the ground.

Under no circumstances should he consent to chimney flues with inside capacity less than 8 inches square, nor

should he consent to have them surrounded by less than 8 inches of brickwork, with a terra cotta or cast-iron flue lining in addition.

As I write, numerous reports are being received by my Company of losses to dwellings from defective flues. Zero weather always brings to every Insurance Company scores of such claims. Within twenty-four hours of this writing a valuable dwelling, costing over $50,000, has been destroyed, the owner and his family barely escaping from their beds, in the middle of the night, to take refuge in ice and snow from a ruined home. It will aggravate his sense of loss to reflect, when he learns the fact, that a few dollars spent in extra brickwork in his chimneys would have prevented the disaster; and he will be justified, probably, in claiming that he would not have thought of practicing such short-sighted economy if the matter had been properly called to his attention by his builder and architect.

It is safe to say that ninety per cent. of the defective flues of the country are due to ignorance on the part of owners as to what is necessary for safety, and not to the short-sighted economy which would save a few dollars at the risk of life and property.

The best method of scaling down requirements to conform to the amount of money which an owner is willing to expend is to go carefully over the specifications and call for alternate estimates from his contractors, so that he may decide intelligently as to what he will omit. In many cases the difference in cost will be so slight that he will probably choose the better method, sacrificing, if necessary, those features of a building which are mere matters of style and appearance and retaining those which make for comfort, stability and durability.

CARPENTER SPECIFICATIONS.

SPECIFICATIONS OF CARPENTER OR WOODWORK for a Dwelling to be erected for JOHN DOE, Esq., located at.....

These specifications are to accompany drawings, made by JOHN SMITH, architect, under whose supervision the work is to be done.

The drawings and specifications are to co-operate, so that anything shown on the drawings and not mentioned in the specifications, or *vice versa*, is to be done, the same as if shown on both drawings and specifications. The drawings and these specifications, moreover, are to be carried out to the full meaning and spirit.

In cases where there may be doubt as to exact measurements, or where the scale measurements differ from the figures, the figures are to govern, and the contractor is to verify all dimensions that relate to his work, or to the joining, fitting or adjusting of his work thereto.

He is also to take careful and exact measurements, and compare and copy wherever or whenever any new work is called for to be a counterpart of or similar to the present work.

Also to verify all measurements at the building whenever his work is subsequent to existing new work, and he is to be responsible for same, unless written notice is given by him to the architect, so that proper adjustments may be made in time.

This contractor must co-operate with all other contractors of the several works, so that work will not be constructed prematurely, necessitating its being taken down to allow the construction of work that should have been previously executed. He is also responsible for the proper adjustment of his work with other works, and to repair, join to and make his work perfect.

This contractor is to furnish all materials for the work herein specified, and said materials are to be the best of their several kinds, unless otherwise specified, subject to the approval of the architect.

In case any materials are not approved by the architect, they shall, upon his request, be promptly removed from the premises.

All the work is to be done in the best manner, according to the full meaning of the plans and specifications, and subject to the approval of the said architect.

This contractor is to be responsible for any violations of the laws or ordinances, whether State or municipal, for the constructing of buildings, and is to hold the owner harmless from any expense or claims for damage to life, limb or property arising from any violation of such laws, ordinances or regulations, or caused by or in consequence of carelessness of himself or his employees.

He is to enclose the building securely with strong muslin on wooden frames, or with temporary doors, sashes and glass, as may be necessary until the permanent sashes are put in; and he is to maintain the building properly enclosed and protected from the weather until finished.

He is to furnish the mason, stone and terra cotta workers with all centres, templates, &c., required for arches and other work.

He is to box all terra cotta and stone work for protection, as directed by the architect, and to do all cutting of woodwork required by any of the other contractors.

He is to do all rough carpentry, such as centres for masons and stone contractors, rough studding, grounds, lintels, etc., in fireproof partitions, where such are provided for, and all wood furring and bracketing that may be required.

He is to furnish and finish trim of all windows and doors, such as architraves, panel-backs, jambs and soffits, etc., for all walls and partitions and piers; all bases, chair-rails, picture mouldings, hand-rails and balusters for stairways; and all necessary woodwork for plumbing.

LUMBER —The lumber used throughout the building, except where otherwise specified, is to be of best quality, kiln-dried, or time seasoned, clear, white pine,* free from sap, shakes or knots, and to be primed as soon as put up.

BALLOON FRAME.—The house is to be put together with Balloon frame in the strongest and best manner and in accordance with the framing drawings and plans with inter-ties and angle braces; and there shall also be diagonal "long" braces or struts for the full length of story joists of each story with the joist cut in to hold the foot of the strut.

The frame and roof sheathing shall supplement and protect the mason-work, and the water table shall project over the face of underpinning and foundation.

* Poplar, especially Yellow Poplar, known in some sections as "White Wood" is admirable, especially for framing. It holds nails well and paints and stains well.

The floor beams of second and third floors shall be notched over the ribbon or girt, to tie the building, the ribbon strip being let into the floor beam, and wherever they come against studs the floor beams shall be nailed securely thereto with three nails.

By "Balloon" frame, as heretofore explained, is meant a construction in which the enclosing studs in side walls run in single lengths from the sill to the wall plate, with proper inter-ties. The studs should be securely spiked to the plate and to the inter-ties and girts or ribbons, with exterior sheathing and back plastering, which insures two sets of lathing—lathing having more or less strengthening and tying effect. This with the diagonal braces or struts ensures a very strong house.

BRACED FRAME.—A somewhat stronger and better but more expensive construction is known as the "braced" frame. In this case the floor beams or joists are supported on timbers called "girts" and "dropped girts," framed into the corner posts and pinned with wooden pins. Angle braces are also relied upon at all angles. See diagram illustrating opposite.

If a "braced" frame is desired the paragraph as to "Balloon" framing should be omitted and the following inserted :

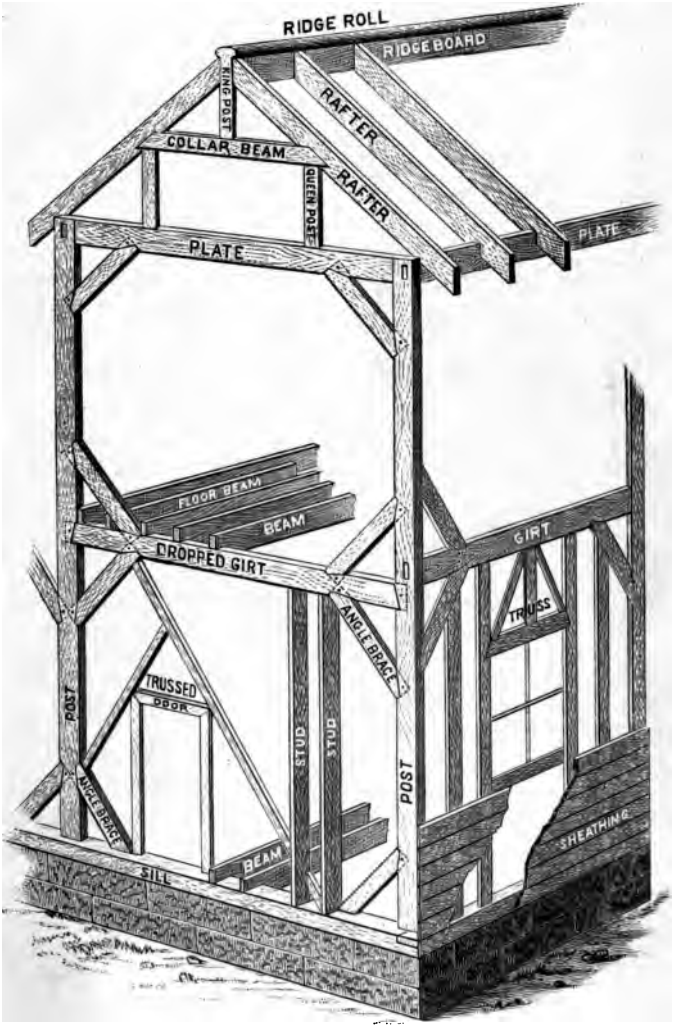
BRACED FRAME.—The house is to be put together with a full braced frame in the best and strongest manner. The first story beams are to be sized and leveled upon the sill and upon the foundation wall and their tops made level. They are to be well spiked to the sill. The beams of upper floors are to be notched down on to the girts and sized upon partition caps, spiking them strongly to form ties across building.

All sills, girts and posts are to be securely framed into each other, mortised and fastened with hard wood pins or trenails, and angle braces are to be used at all angles and corners, securely mortised, draw-bored* and pinned.

TIMBER DIMENSIONS.

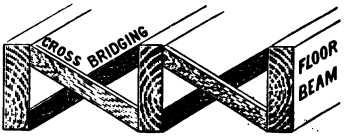
BEAMS OR JOISTS.—All floor beams or joists of first, second and third stories shall be 3"x12", (3"x10" are cheaper but not so good,) 16 inches from centres, of yellow pine, and they shall be

* *i. e., the hole* for the pin is bored nearer the shoulder of the stick or beam *than the hole in the* mortise. As a consequence driving the tapering pin draws the two together and makes a firm joint.



BRACED FRAME SHOWING NAMES OF TIMBERS, SHEATHING, TRUSSED WINDOW, ETC.

notched or "sized" on their supports so that their upper surfaces shall be level (the next best and cheapest timber is spruce, and the cheapest hemlock.) There shall be proper cross, herring-bone bridging 2"x3" every five feet, between beams, firmly nailed with two nails in each end.*



CROSS BRIDGING OR STRUTS BETWEEN FLOOR BEAMS.

All floor beams above the first tier shall be notched over the girt or ribbon, to properly tie the building, the ribbon being let into the beam and into the studs, and the first tier of beams shall be notched so as to rest on the sill and also on the cellar walls or underpinning for a better bearing.

(Note. It is better to have a middle wall of brick in the cellar, eight inches thick, to carry the ends of floor beams, rather than to employ a girder with posts or brick piers. It costs more, but do not omit it. If wooden posts are used they should be set upon a stone above the level of the floor, to prevent rot. Never have stud partitions in a cellar, as they are liable to decay and to breed vermin.)

RAFTERS.—Main rafters shall be 2"x6", set 16 inches on centres. Hip rafters 4"x8" securely spiked to the plate and notched thereon.

All hip and valley rafters to be extra width if jack rafters are employed, so that the lower edges of the latter will not project below the bottoms of the former.

NOTE.—If the main rafters are unsupported for a greater span than 18 feet, they should be 2"x9", 16 inches on centres; or if slate roof 3"x8", 16 inches on centres. I prefer 2"x12" rafters 12 inches on centres to 3"x8" 16 inches on centres. For longer spans the roof should be trussed by king post or king and queen post bracing with collar beams and tie-beams.

HIPS.—The hips shall be 3"x10".

GIRTS.—The girts shall be 2"x6," (if Braced frame 4"x10.")

ENCLOSING AND PARTITION STUDS.—The partition and enclosing studding shall be 3"x4". (Some prefer 2"x6" especially with back plastering.) Door and window studs 3"x4" set

* *Some builders* simply nail plank with squared ends between the beams. *This adds to the weight* to be carried without strengthening the floor. The cross *bridging strips* should extend from the top to the bottom of beams, forming an *between them*, strengthening them like a truss.

double. Where partitions have no support beneath, there shall be 4"x6" struts from floor to floor in such partitions.

There shall be double studding at sides of all windows and doors and the studding shall be trussed over all window and door frames more than three feet wide.

Where a partition of one story comes directly over a partition of the story below, the studs of the upper partition shall foot directly on the cap of the lower partition, or on the supporting girt of the floor beams and not upon the floor beams; and in all cases where it is unavoidable to have a partition foot upon the floor beams the studs shall be arranged to come above the beams and to foot upon a sole of yellow pine one inch thick and 6 inches wide or 2 inches wider than the stud. This contractor is to set all studs between which furnace hot air pipes come, sufficiently wide apart to leave three inches of space between the hot air pipe and any stud, and he is to confer with furnace contractor for dimensions.

SHRINKAGE.—The contractor is to see that equal quantities of shrinkable timber are under the vertical studs or posts of parallel walls or partitions in all cases.

NOTE.—This is very important. Beams and other timber laid horizontally shrink materially in thickness—it being remembered that timber shrinks crosswise and not lengthwise. If there should happen to be ten or twelve inches more of timber footing under the beams of one partition than under those of another there will be irregular settling of the floor beams and breaking of the plaster ceilings. It is easy to remedy this, for in cases where it is not possible to cut down the amount of timber on one side, the footings on the opposite side can be built up to equal it.

CENTRE STUDS.—This contractor shall set a stud in the middle of each side wall of the dining-room, parlor, hall, library and principal bed-rooms, to provide for the hanging of heavy mirrors, pictures, armor trophies, etc., except where such centre space is occupied by a window or door or a chimney breast.

No wood shall be inserted in a chimney breast where it will be within eight inches of the inside lining of a smoke flue.

PLATES.—The plates shall be 4"x6".

POSTS.—The posts shall be 4"x8".

SILLS.—The sills shall be 4″x8″, (if Balloon frame 4″x6″ *i. e.*, 2″x6″ double and boxed sills shall be made in the strongest manner.) All sills shall be halved at corners with beveled joint and set in cement mortar on top of foundation wall.

ATTIC CEILING JOISTS shall be 3″x8″, 16 inches on centres.

BRACES 4″x6″.

PLASTER GROUNDS AND FURRING.—Fur walls etc., for plaster and set ⅞″ grounds for plasterer. This contractor shall fur for back plastering between exterior studding with 1″x1½″ spruce furring strips.

INTER-TIES shall be 4″x10″ framed into posts and spiked to studs.

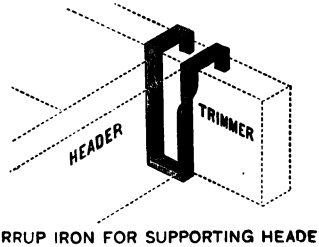
VERANDA AND PIAZZA TIMBERS.—Beams shall be 4″x10″, framed into sills, 8 feet from centres. Girders 4″x8″. Sills 4″x10″, or 2″x10″ double. Joists 2″x10″, 12 inches on centres. Hip rafters 3″x10″. Rafters 2″x6″, 16 inches on centres.

Ceilings of porches and balconies shall be of ⅞″x2½″ planed tongued, grooved and beaded yellow pine, well seasoned, clear of knots, sap and shakes. The ceiling on rafters to be finished with fillet and cove.

The floor shall pitch from building to the front of piazza ¼ inch to every foot of width.

Columns of veranda to be of best yellow pine, 12 inches in diameter (if smaller desired so specify) natural wood finish, well seasoned and centre bored. (White wood is less expensive and good enough if they are to be painted, plain boxed painted columns are cheaper still.)

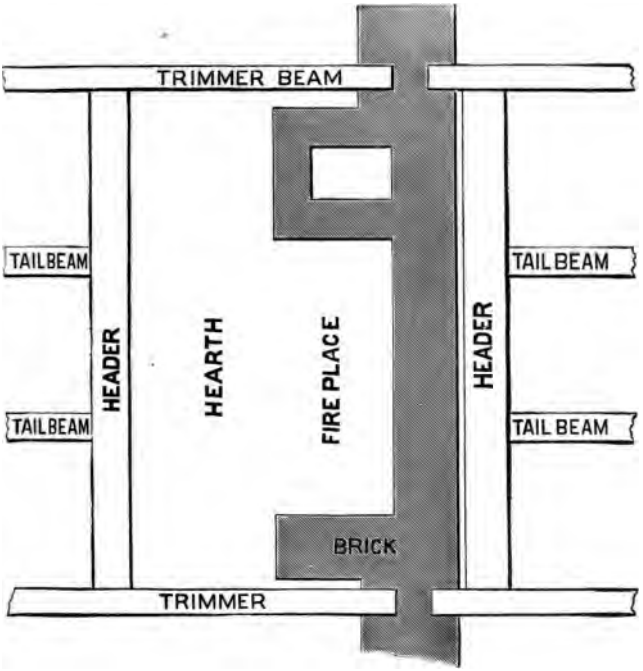
HEADERS AND TRIMMERS 4″x10″ framed with mortise and tenon and tusk joint, but if carrying more than three tail beams they shall be secured to the trimmer beams with wrought iron stirrup irons, sometimes called "Bridle Irons."



STIRRUP IRON FOR SUPPORTING HEADER.

FRAMING.—All framing to be substantial, properly braced and plumbed. All beams and joists shall have the crowning edge placed upward, and shall be properly sized and securely fastened together. (Note, as a result of seasoning it often happens that one

side of a beam or joist will become convex or rounded. This is called the crowning edge.) All trimmers and headers if less than 4"x10," shall be framed double, and there shall be not less than eight inches space between woodwork and the inside of any flue or chimney.



FIRE PLACE SHOWING HEADER, TRIMMER AND TAIL BEAMS.

SHEATHING.—The building is to be sheathed on the outside frame with good, sound, tongued and grooved hemlock boards, free from loose knots or holes, planed one side, not exceeding six inches in width and not less than $\frac{7}{8}$ inch thick, nailed with two tenpenny nails to every bearing and driven close together. The sheathing to be placed on the studs of the frame horizontally, and not diagonally.

(Note.—As stated on page 16 some experts prefer diagonal sheathing. I find the majority favor horizontal nailing. It is moreover, less expensive in material and labor. Let every man

be fully persuaded in his own mind. Where clapboards are used the joints may occasionally coincide with the joints of the horizontal sheathing—an objection; with shingles it does not make any difference.)

The outside of the sheathing shall be thoroughly covered with the best quality of building paper, the joints well lapped and secured by shingle nails, protected with tin washers not less than ¾ inch in diameter. Use best quality of heavy rozin sized, building paper. (Tar paper objectionable.)

SHINGLED SIDE-WALLS.—The shingles are to be first quality, 16" cedar shingles, uniform size, plain butts, clear of knots and cross grain, and to be nailed with two galvanized nails in each shingle. They shall be laid 5 inches to the weather.

CLAPBOARDS.—Those portions of the wall indicated on the plans to be covered with clapboards shall be covered with pine clapboards, sap extra, laid to an even gauge not more than 4½ inches to the weather, to be securely nailed with galvanized nails, set in for puttying, to every stud.

EXTERIOR WOODWORK.—This shall be of best quality of white pine lumber as specified and shall be well painted before being put up, with back primed.

ROOFS.—The roofs shall be covered with sound, tongued, grooved and planed hemlock or pine boards, not over six inches wide nor less than ⅞ inch thick, well nailed to every rafter. These shall be covered with double thickness of best quality, heavy, Neaponset sheathing paper, well stretched lapped and nailed through tin washers ¾ inch in diameter.

All roofs and sides of dormers to be covered with first quality of Monson or Bangor slate (in some sections Pennsylvania slates are cheaper) 9"x18", properly trimmed and provided with counter sunk drilled holes, all slates to be laid in parallel courses seven inches to the weather, each slate to be nailed with two galvanized iron nails with wide heads, and all nail heads to be covered. Slates at all ridges, hips, valleys and eaves are to be trimmed so that the bond will be uniform and, where necessary, mitred and set in slater's cement, except where copper ridge-rolls and ridges are specified. Put Ridge boards 1"x8" and Ridge Rolls to all Ridges See illustration, page 75.

(NOTE.—If the slate is laid in mortar it makes a cooler roof and ensures a better bedding for the slate, securing

immunity from breaking. If decided upon, it costs something more and should be specified at this point.)

SHINGLE ROOF.—If shingle roof is desired the specifications should read as follows: Roof to be covered with first quality cedar shingles, of uniform size, plain butts, clear of knots and cross grain, to be nailed with two galvanized iron nails, with wide heads, in each shingle, and laid 5 inches to the weather. They shall be securely nailed to $1\frac{1}{8}$"x$2\frac{1}{2}$" shingling strips, nailed two inches apart on the sheathing of the roof.

(These secure an air space between the sheathing and the shingles and will make the roof cooler and tend to prevent decay from moisture, which will be slow in drying where the shingles are applied flat to the sheathing. If it is desired to lay the shingles in lime mortar it should be here specified. It is a mistake to lay shingles in lead paint on the sheathing, as it tends to rot them.)

COPPER ROOF.—If a copper roof is desired, tinned copper should be specified, in order that joints may be soldered.

CORNICES.—Finish with facia, belt, etc., as per detail drawings.

PIAZZAS, VERANDAS, &c.—These shall be constructed in the strongest and best manner, in accordance with detail of working drawings to be prepared by the architect. Timbers to be of sizes already specified, and flooring to be best yellow pine, clear and free of sap, shakes and knots, $1\frac{1}{8}$ inches thick and $2\frac{1}{2}$ inches in width, the joints to be laid in white lead paint mixed thick. The floor shall incline to front $\frac{1}{4}$" to every foot. The piazza columns where they rest upon the flooring shall be laid in lead paint mixed thick and the joint well puttied.

Note.—Be sure to avoid sap lumber in the piazza floors, as it decays rapidly when exposed to the weather.

FLOORS.—All floors are to be laid double, with an under floor of $\frac{7}{8}$"x6" planed, tongued and grooved hemlock (or North Carolina pine this is pine with the pitch removed, it is cheap and better than hemlock,) laid diagonally on floor beams. On top of this floor is to be laid Salamander or asbestos paper (specifying thickness desired). Salamander is waterproof as well as fire-proof. (See page 26). (Where a fire-stop is not desired, best quality of waterproof building paper can be used, the kind to be specified.) The top floor shall be of best seasoned clear, comb grain yellow pine, free from sap, shakes and knots, $\frac{7}{8}$ inch thick and $2\frac{1}{2}$ inches wide, tongued, grooved and planed,

blind nailed in the tongue without broken or defaced edges. In some sections white pine for floors is very much cheaper.

The under floor shall be carried between the studs to the outer sheathing, fitted closely to cut off drafts from story to story and form support for fire-stop, brick "nogging," etc.

While all of the flooring is to be of the best quality, the contractor is to select the choicest for the parlor, dining-room, hall, library and principal bed-room floors.

BORDERS TO HEARTHS.—There shall be neat borders with mitred corners, 3" wide, laid around all hearths.

BASE BOARDS to be as per detail, blocked behind and laid close to floor and plastered behind down to the floor.

FLOOR DEAFENING.—All floors shall be deafened with a concrete three inches in thickness (two inches if beams are 2"x10") composed of one part in volume of cement, three parts sand and five parts well screened cinders, mixed with as little water as possible, and supported below each floor by deafening boards on shoulder strips $\frac{7}{8}$"x2" nailed to the floor beams three inches below the tops of same, said boards to be $\frac{1}{2}$ inch thick and nailed crosswise of the beam. (Note.—Mineral wool makes a good deafening for floors.)

DOORS.—The main front door (and any others specified to be of hard wood) shall be of clear white pine core, $1\frac{1}{4}$ inches thick, veneered with quarter sawn oak, $\frac{1}{4}$ inch thick, on both sides, the door to be paneled and moulded on both sides as per detail, the main entrance to have two-inch solid rebated jambs of oak. (Note.—Hardwood outside doors are best made built up of staves or flat pieces glued together.) All other doors shall be first-class, four panel "stock" doors, double faced, made of best white pine, well seasoned, $1\frac{1}{8}$ inches thick. Where any inside door swings back against a furnace register or is exposed to stove or other heat it shall be a veneered door. All doors to have the usual trim, architraves on both sides and to be hung with loose joint butt hinges large enough to swing clear of the architraves.

VENEERED DOORS.—Note, if other doors are desired veneered they should be specified.

DOOR SILLS OR THRESHOLDS to be of hardwood (specify oak, yellow pine, etc., as desired.) All sills to outside doors shall be fitted with rebates to keep out rain or snow.

SIZES OF DOORS as follows: First story 7' 6," etc., etc.

All sliding doors shall run upon overhead trolleys, and the frames in which such doors run shall be well cased in pockets with half inch tongued and grooved material, especially above trolleys, so as to prevent drafts of air.

Stop to be placed in pockets back of doors.

The door between dining room and butler's pantry shall be a swinging or fly sash door, as shown on plan, the glass to be ground glass, except that it shall have a border of clear glass $\frac{3}{8}$ inch in width, with corners, Key Pattern. (This to enable persons approaching to see each other and to avoid collision. Any ornamental design may be specified, but a neat and inexpensive finish is the one indicated.)

BED-ROOM DOORS.—All bed-room doors shall have ground glass transoms or fanlights, the glass to be not less than 12 inches high; all to be furnished with bronze adjustable, lever, transom openers.

BASE KNOBS AND FLOOR STOPS.—This contractor is to put rubber-tipped base knobs behind all doors, of maple or the wood to correspond with the trim of the room. (This will add little to the bid of a contractor estimating, but will cost one hundred cents on the dollar if omitted and inserted afterwards.)

HATCHWAY DOORS TO CELLAR.—These to be made of clear white pine $1\frac{1}{8}$ inches thick, tongued, grooved and beaded, cross battened on the back with four cross battens of $1\frac{1}{4}$ inch pine, $4\frac{1}{2}$ inches in width, beveled edges, the battens to be screwed on; the doors to properly lap the opening at the head and sides and to shed water over the top step stone. Hang the doors with three sets of best strap hinges to each fold and attach a strong oak bar with staples on the inside for fastening the same.

STAIRS.—All stairways shall be built where located on plans in the strongest manner and shall be put up after plastering is dry. They shall have strong plank strings not less than two inches in thickness, and if either string is not supported by a side wall or partition it shall be 3″x8″. In all staircases there shall be a centre carriage timber not less than 3″x8″. The main staircase shall have treads not less than 12 inches wide, excluding the nosing, framed or housed into the string, with risers not more than $6\frac{1}{2}$ inches high, and the treads shall be not less than $1\frac{1}{4}$ inches thick. All treads and risers shall be properly wedged, glued and blocked and the treads shall be ploughed or housed into the risers and the risers ploughed into the underside of treads. The main

staircase treads, stringers and risers, shall be of the best quarter sawn oak, (or cheaper wood if specified) and finished as per detail. All staircases shall be strongly bracketed under each step.

The rear and attic stairs to be of best quality yellow pine. They shall not be less than 3′ 6″ wide in the clear.

OUTSIDE PIAZZA STEPS.—The outside steps shall be constructed of strips 1¼ inches thick and two inches wide, placed an eighth of an inch apart, the outer strip of each step being three inches wide, to allow for projection or nosing.

(If it is preferred to have board treads, the specifications should here provide that they shall be bored with small auger holes, ornamental pattern, to drain off the water.)

NEWELS, RAILS, BALUSTERS.—These shall be of the best quality of quarter sawn oak, for the main staircase, and of ash for all other staircases, as shown in the detail. All balusters shall be firmly dove-tailed to the treads.

FIRE-STOPS.—All staircases shall be properly fire-stopped, to prevent the passage of fire through the interior from story to story.

INTERIOR FINISH.—Base boards shall be put down in all rooms and halls and shall be set upon the under floor if the floors are double, or tongued into the floor plank if the floors are single, (this is important as it will prevent joints opening between the base board and the floor as the wood shrinks,) beads on all angles, the base 8 inch moulded, throughout, except in closets, where there shall be 6 inch base boards. The window trim shall be pilaster finish, with base and turned corner blocks and 5½ inch rebated stool with apron, made of casings returned at each end.

Sweeping mouldings shall be placed around the foot of bases in all rooms and closets.

All standing trim to have back primed before put in place (this important as it will save injury to it from dampness in new plaster.)

MANTELS.—These will be furnished by the owner and set by this contractor, (if to be set by the mantel man so specify.)

PICTURE MOULDINGS.—There shall be a 2-inch picture moulding, as per detail, fitted around all rooms of the house, including bath-room, excepting attic, kitchen, closets, laundry and pantries. This to be of pine, or wood to correspond with finish. (If a gilt moulding or hard wood moulding is required, so specify.)

CLOSETS.—All closets and pantries shall be fitted up as shown on plans, with drawers, shelves and neat hook-racks or cleats, planed and beaded, for the reception of double wardrobe hooks, which shall be of best quality bronze, (or japanned iron if preferred) the hooks to be furnished by contractor. The hooks, unless otherwise specified, shall be at the height from the floor of 5′ 6″ for the top rack and 4′ 6″ for the lower. There shall be shelves in all closets, 1″ stuff, 14 inches in width, commencing three inches above the hooks and painted two coats. (Note, it improves the shelves to be painted and costs little, protecting them from grease stains, etc.)

The ceilings of all closets to be same height as those of rooms.

MOTH PROOF CLOSET.—Here specify for Cedar or Camphor wood lined closet, if desired, see page 44.

LINEN CLOSET.—There shall be drawers and shelves in closets as shown on plans. Plan should show shelves and drawers.

BUTLER'S PANTRY.—This shall be of size shown on plans and shall be fitted up with counter shelf and closets with glass sliding doors as shown; also with panel doors.

This contractor shall furnish all the trim for the butler's pantry, including dish heater and shall build drip and frame work for butler's sink, which latter is to be furnished by plumber, all as per details.

Shelves wherever specified shall be of $\frac{7}{8}$ inch pine lumber, with turned supports and shall be painted both sides.

KITCHEN.—Kitchen dresser shall be furnished the same as for butler's pantry; cupboards as shown.

Put neat clock shelf in kitchen.

This contractor shall do the necessary framing for sink.

CLOTHES CHUTES TO LAUNDRY if provided, should be of metal, not wood.

DUMB-WAITERS.—The shafts for these should be, if of wood, lined with tin, with lap welded or folded joints. In brick or stone houses it is well to have them constructed of incombustible materials, so that they will not carry flame from one story to another. Murtaugh's Patent Dumb-Waiter is a convenient one.

STORE-ROOM.—Behind the plastering of the walls and ceiling of the store-room, and between the double floors thereof, shall be inserted galvanized wire netting, $\frac{1}{8}$ inch mesh, securely lapped at corners and angles, so as effectually to exclude rats, mice, roaches and other vermin.

WAINSCOTING.—The kitchen and bathrooms shall be wainscoted 3 6" high with ⅞ inch Georgia pine, (or other hard wood, ash, etc., as may be preferred) three inches wide, planed, tongued, grooved and beaded, with a moulded cap, to be finished with filler, etc., as specified for interior woodwork.

(Note.—If bathrooms are desired to be more safe as to fire, they should be wainscoted with marble, tiling, King's Windsor Cement or Keene's Cement, and it should be so specified.)

TANK.—The tank is to be located as shown in plans and is to have a capacity of 500 gallons, measurements to be taken between the bottom of overflow and the pipe which supplies house. It shall be built in the best manner, of 2"x4" stuff, laid flat, woven at corners, and lined with 16 ounce tinned copper, the copper to be furnished and lined by plumber.

There shall be a scuttle near the same and a strong ladder, with treads 4 inches wide, furnished by this contractor.

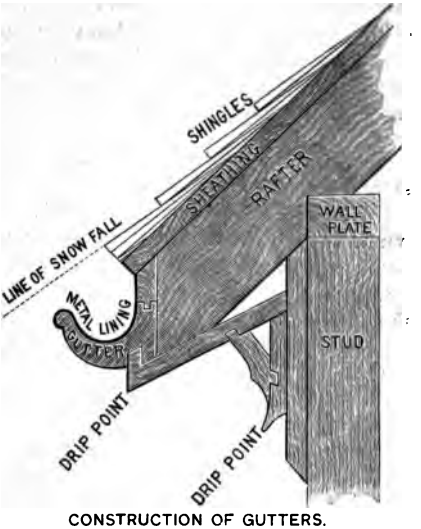
If iron tank desired so specify at this point.

CORNICES.—All outside cornices shall be constructed in the best manner, and shall be painted with three coats of best paint. (It is perhaps better to specify two coats, and have a third put on the following spring.)

GUTTERS.—These to be of best quality 16 ounce copper, secured by galvanized iron hangers, securely fastened to the roof under the slate by galvanized iron nails or screws. To be not less than 6 inches wide.

The arrangement of gutters is a more important matter than is generally supposed. They should be, if of wood, lined with metal, copper being best of all, on account of its exemption from rust, and the several pieces of which the gutter is composed should be tongued into each other, the joints being set in white lead paint. Facia should be constructed to prevent water from backing up against the side of the building, and drip points to all vertical pieces should be made so that water would drop from these points without running against *and down* the side wall.

The matter is illustrated in the accompanying diagram. Where hanging metal gutters are arranged great care should be observed in having the hangers of galvanized iron, and the gutters also, although copper is of course, better.



CONSTRUCTION OF GUTTERS.

Gutters should be so arranged as to be safe from injury by sliding snow from a pitch roof. While extending sufficiently beyond the line of shingles to catch the rain water, the outer edge should be sufficiently lower than the line of the pitch roof to insure that snow and ice shall slide beyond the outer edge and not strike the gutter. This feature of the gutter can be tested by laying a straight edge on the slanting roof and observing that the outer edge of the gutter is below the line of the pitch.

LEADERS AND CONDUCTORS.—To be of 16 ounce copper, and to be not less than 3 to 4 inches in diameter inside measurement.

FLASHING.—All flashings shall be of 16-ounce H. C. rolled copper, (if galvanized iron, tin or zinc desired for cheapness so specify and paint both sides) and this contractor is to properly flash all valleys, hips, ridges, angles or other places requiring flashing, the flashing of valleys in no case to be less than 14 inches wide. The flashing shall not extend less than 18 inches under the slate or shingles, on the upper side of chimneys, dormer windows or other places where snow or water is liable to back up against the roof; and in the case of chimneys it shall be securely cemented

into groove or joint in the brickwork for a height of at least 8 inches above the roof and lap over the flashing below which shall extend up 7½ inches from roof but the lap shall not be within one inch of the roof. (Note, this to prevent ascent of water by capillary attraction.) Where shoulders occur in roofs tending to lodge snow, crickets or pitch roofs shall be made to slide snow beyond roof.

All ridge rolls and hip rolls shall also be covered with copper saddles extending over ridges.

HARDWARE, METAL WORK, ETC.—All doors and windows are to be fitted complete with all hardware required, of best bronze, manufactured by the Russell & Erwin Manufacturing Co. (state any other manufacturer preferred) and approved by the architect.

The owner will furnish all locks for doors, also bolts, door hinges, door knobs, closet catches, sash lifts and sash fasteners. This contractor is to furnish all other hardware and metal work and fixtures for the building, including the metal sash chain, which is to be of best quality of red metal, and all sash weights. All sash weights exceeding 20 pounds in weight shall be of lead He is to accurately weigh each sash separately to ensure proper balance of weights.

This contractor is to attach and put in place all hardware furnished by the owner as well as that furnished by himself and to notify owner when it is wanted, giving list and description of that to be furnished by owner as above.

The front and outside doors are to have mortised bolts.

The bed-room doors will have mortised bolts with brass knobs.

All sliding doors and sliding sash shall have bronze knobs, locks, etc., and all small closets, presses and drawers shall have suitable locks and other hardware approved by the architect.

CLOCK SHELVES.—Put neat clock shelves in servants' rooms as well as in kitchen (elsewhere provided for.)

These are simple matters but will practically add nothing to the cost of the house if included in the specifications.

WINDOWS AND SASH.—All window frames, except where otherwise specified, shall be of stock sizes and shall be constructed in the best manner, as per working drawings. The pockets for weights shall be of proper size.

COPPER POCKETS TO WINDOWS.—The tops, sides and bottoms of outside window casings are to be covered with 16 ounce copper tacked closely on the caps and sides of window

frames and run under the weatherboarding or shingling of the side wall at least three inches. (Other metal, zinc, tin, etc., may be specified if economy is desired.)

If the side-walls of the building are of stone some experts insist the window and door frames should not be inserted until after the walls are laid and the stone work brought to a smooth square finish for the openings.

All the lifting sashes throughout the building are to be carefully weighed and balanced and hung with metal chain, approved by architect, all on grooved square, 2½" channel, noiseless, axle pulleys, furnished by this contractor.

All sashes to be of best clear white pine, 1⅛ inches thick, except that where plate glass is specified the sash shall be two inches thick, and all sash shall have weather lipped meeting rail and acorn mould sash bar.

PANELS under windows shall be finished without any hollow spaces behind them and plastered at this point, down to the floor.

All frames shall be properly primed before being brought to the building.

All windows shall have the proper trim.

Architraves on windows on the outside walls and piers to be set on the inside casings and window boxes.

Specify heighth of window sills from floor, see page 40.

CELLAR WINDOWS.—The frames to be of 2-inch clear white pine, to be built in the wall or underpinning when the same is being laid; window to be protected by an iron grating of galvanized iron rods ¾ inch in diameter, placed perpendicularly and let into the frame at top and bottom, with storm sash as elsewhere specified.

GLASS.—All sash marked "plate" shall be best quality polished American plate. All windows not designated for plate glass shall be glazed with double thick first quality glass.

BLINDS.—All windows shall have best quality of outside blinds, with rolling slats, made of dry, clear, white pine, 1¼ inches thick hung on wrought iron right angle butts and furnished with fastener and best quality of blind adjuster; to be painted with best quality of paint—color as indicated by owner.

STORM DOORS AND SHUTTERS.—All doors, windows and other openings on the first floor, and cellar openings, shall be provided with storm doors and shutters, made in the strongest manner, of tongued and grooved, white pine, ⅞ inch thick and 8 inches

wide, nailed with galvanized wrought iron nails clinched. Each shall be plainly marked to indicate the window or door to which it belongs. They shall be painted both sides with two coats of the best paint, inside white and outside to correspond in color with the window frames of the house. (If desired, small glass lights may be let into the shutter. Be sure to have them water-tight.)

The storm door of the kitchen shall be hung on hinges and fitted with a Yale lock, using the same key as the lock to the main kitchen door, which shall also be a Yale lock. See page 46.

PLUMBING.—The plumbing work of all basins, water-closets and sinks is to be left exposed, so that no woodwork will be required. All plumbing or other pipes running from story to story shall be protected by this contractor with woodwork ducts or boxing of tongued, grooved and beaded narrow stuff. (Here specify pine, oak, ash or other wood decided upon.) It shall be fastened with screws, so that it can be removed to examine pipes at any time.

This contractor is to make all pockets and boxes that may be required for electric cut-outs; these to have hard wood panel covers, secured with hinge, as directed.

RUBBISH.—At such times as the architect may direct, this contractor is to gather up all of his rubbish and surplus materials and put same in barrels, to be removed from the premises. He is to leave his work clean and perfect on the completion of the building.

TEMPORARY PRIVY FOR MEN.—This contractor is to construct proper roofed and enclosed privy where directed, for workmen and to remove same when building is finished.

COAL BINS IN CELLAR to be built where shown and as per detail.

COLD-ROOM.—Construct cold-room, for milk, food, etc., in cellar where shown on plan, the frame to be of pine, covered with fine meshed copper wire. (If cheaper, green wire preferred, so specify; the difference in cost is slight.)

(If other closets desired in cellar, for wine, etc., here specify.)

PERSONAL SUPERVISION.—This contractor is to give his work his personal superintendence and is to keep a competent foreman constantly on the premises, and he is not to sublet the whole or any part of his work without the consent in writing of the owner.

ALTERNATE ESTIMATES.—This contractor is to submit estimate for all the woodwork throughout the building to be of quarter sawn oak, instead of pine. Also to submit estimate for woodwork in ash. Also to estimate for floors to be laid with best quality of North Carolina pine instead of best quality of yellow pine.

(Any other alternate specifications which owner may desire for cheaper or better construction may be here inserted, so that he may be able to decide on a more elaborate or more simple finish, if he chooses)

MASON SPECIFICATIONS.

SPECIFICATIONS OF MASON'S WORK, for a Dwelling to be erected for JOHN DOE, ESQ., located at.....

These specifications are to accompany drawings, made by JOHN SMITH, architect, under whose supervision the work is to be done.

The drawings and specifications are to co-operate, so that anything shown on the drawings and not mentioned in the specifications, or *vice versa*, is to be done, the same as if shown on both drawings and specifications. The drawings and these specifications, moreover, are to be carried out to the full meaning and spirit.

In cases where there may be doubt as to exact measurements, or where the scale measurements differ from the figures, the figures are to govern, and the contractor is to verify all dimensions that relate to his work, or to the joining, fitting or adjusting of his work thereto.

He is also to take careful and exact measurements, and compare and copy wherever or whenever any new work is called for to be a counterpart of or similar to the present work; also to verify all measurements at the building whenever his work is subsequent to existing new work, and he is to be responsible for same, unless written notice is given by him to the architect, so that proper adjustments may be made in time.

This contractor must co-operate with all other contractors of the several works, so that work will not be constructed prematurely, necessitating its being taken down to allow the construction of work that should have been previously executed. He is also responsible for the proper adjustment of his work with other works, and to repair, join to and make his work perfect.

This contractor is to furnish all materials including water for the work herein specified, and they are to be the best of their several kinds, subject to the approval of the architect; also all tools, moulds, scaffolds, planks and plant necessary to carry out his contract.

All the work is to be done in the best manner, according to the full meaning of the plans and specifications, and subject to the approval of the said architect.

In case any materials are not approved, they shall, be promptly removed from the premises.

This contractor is to be responsible for any violations of the laws or ordinances, whether State or municipal, for the constructing of buildings, and is to hold the owner harmless from any expense or claims for damage to life, limb or property arising from any violation of such laws, ordinances or regulations, or caused by or in consequence of carelessness of himself or his employees.

This contractor is to furnish everything necessary to enable him to do the work required in these specifications and to comply with his contract, such as scaffolding, tools, derricks, inclosures, bridges, platforms, plankings and planks for scaffolding for stone contractors.

He is to keep the cellar free from water, and his work under this contract shall include all that shown on the drawings and set forth in the specifications, including the following items: excavations, all brickwork, all stonework, all fireproof partition work and beam arches, if any, all concrete and deafening, except the concrete of the cellar floor, which is included in the plasterer's work. (Some prefer to have mason do this work.)

LIME MORTAR.—Lime mortar where specified shall be mixed in the following proportions and manner: Only the best quality of well burned stone lime is to be used; no shell lime will be permitted. It shall be slaked in a water-tight box of planks, with plank bottom, twelve inches deep, and the lime shall be introduced one cask at a time, to which shall be applied two barrels of water to one barrel of lime. The pen shall then be covered until the whole is reduced to a smooth uniform paste, after which clean sharp sand shall be added in the proportion of two parts in volume of sand to one part of lime paste. No mortar shall be mixed in the cellar after 1st tier of beams is laid. (See page 103.)

(Note.—Under no circumstances should lime be slaked on the bare ground, or in a hollow made by an embank-

ment of sand—and yet this is the common practice. The water is, also, frequently applied with a hose. It should be added to the lime in volume by upsetting a barrel as quickly as possible. After the lime paste is made it should be allowed to stand as long as possible before being mixed with the sand. The proportion of one part of lime paste to two parts in volume of sharp sand is about equivalent to one part of dry lime and four parts of sand. Where cement is added the mortar must be used immediately after mixing the cement, as it is liable to set rapidly.)

The lime should be properly stirred while slaking, but much of the stirring will be saved and the mortar will be improved by the covering of it as quickly as possible.

Lime mortar made in this way may stand for weeks, but, as already stated, cement mortar must be used at once.

LIME AND CEMENT MORTAR.—Lime and cement mortar shall be mixed one part cement, one part lime, first reduced to lime paste, and two parts clean, sharp sand.

(Note.—This does not give as strong a mortar as cement without the lime, which added causes the mortar to set more slowly. It is a common error to construe the phrase "one-half cement" to mean one part cement to two parts of lime; but what is meant is one cask of cement to each cask of lime, not half a cask of cement to one of lime. The proportions are those used for United States public buildings.)

CEMENT MORTAR.—Cement mortar where specified shall be mixed in the following proportions: one part in volume of best Rosendale Cement (except where Portland Cement* is specified) and three parts of clean sharp grit sand (except that in walls below ground and in cisterns the proportion shall be two parts sand) well and thoroughly mixed together, in a clean box of boards, before the addition of water. It must be used immediately after being mixed. Cement mortar left overnight shall not be used. The sand and cement shall be approved by the architect.

*I have used the Atlas cement and find it a reliable and excellent article.

CONCRETE.—Concrete where specified shall be made in the following manner: one part in volume of best Rosendale Cement (brand selected by architect) three parts of clean, sharp, grit sand and four parts of best, clean, washed gravel or clean broken stone, the pieces of which shall be small enough to pass in any direction through a two-inch ring; except that concrete for the bottom of cistern shall be mixed one part Portland Cement, two parts clean sharp grit sand and four parts clean gravel or broken stone as above specified. It shall be measured dry and thoroughly mixed before water is added, and shall be of a consistency when ready for use to be capable of standing on a steep slope without the water running from it. It shall be then rammed carefully in place until the surface is moist, and shall be protected from disturbance by walking or otherwise for at least twelve hours.

EXCAVATIONS.—This contractor shall excavate for the cellar as shown by the foundation plan and eight inches in excess all around to a sufficient depth to secure the height of ceiling prescribed for the cellar between the top of the concrete floor and the underside of the first story floor beams—eight feet.

He shall excavate all trenches under walls, and remove, if required, dirt and rubbish made, and shall grade around building as required, carefully removing all top soil and loam to a proper distance, where it will not be in the way of other grading or work, which he shall afterwards replace and prepare with a suitable surface for seeding or sodding.

He shall, after mortar is dry, fill in the excavation and "water-ram" the earth about walls, using sufficient water to puddle and settle firmly.

DRAIN AND SEWER PIPE.—He shall excavate trenches not less than three feet deep for all drain and sewer pipes, the trench for the sewer pipe to the cess-pool or sewer to have a fall of one-quarter inch to one foot. He shall co-operate with the plumber, who shall furnish and put down the drain pipe required.

BRICKWORK.—Wherever brickwork is required the bricks shall be of the best quality Haverstraw or Matawan (or other manufacture which the contract may specify) hard burned, fine, compact and uniform in texture, regular in shape and uniform in size. No bats, crooked, cracked, swelled, "salmon" or "pale" bricks will under any circumstances be allowed in the work, and if taken to the premises shall be promptly removed therefrom. (By pale brick is meant half burned brick not the light colored bricks intended to be light in color which may be thoroughly hard and

well burned, and which sometimes produce pleasing effects.) The bricks shall be laid, unless otherwise specified, with close rubbed or "shove" joints, and every sixth course shall be a course of headers,* so that the bond will consist of five courses of stretchers and one of headers, except in cistern walls, where they shall be laid alternately one course of headers and one course of stretchers. (If bricks laid in freezing weather to be laid dry and warm and in cement mortar and if laid in non-freezing weather to be well wet before being laid.)

The masonry walls shall be carried up evenly; no part shall be carried more than 4 feet in advance of the rest. All angles shall be properly bonded.

No grouting shall be permitted unless expressly specified. (Grout is liquid cement usually poured into the wall to fill joints. It is objectionable in stone work but may improve brick walls.)

Brickwork intended to be plastered shall be laid with rough joints.

FOUNDATION WALLS.—All brick in foundation walls shall be laid in cement mortar and the exterior to the surface of the ground shall be plastered with cement and when dry, covered with liquid asphalt applied in two coats. All other walls shall be laid in lime mortar except that chimney tops above roof and cistern walls shall be laid in cement mortar.

FOUNDATION FOOTING COURSES.—This contractor shall prepare a footing course of concrete one foot thick or of sufficient thickness to safely bear the weight to be imposed thereon and one foot wider than the foundation wall—concrete mixed as hereinbefore specified.

PIERS.—No piers shall be less than 12″ square if of brick nor less than 20″ square if of stone.

STONEWORK.—All stonework shall be carefully laid, with proper bonds, no wall to be less than 18″ thick, each stone to be laid on its natural bed and in foundation walls both sides shall be brought to face no projecting stones to be permitted; all joints to be well filled and pointed. (It is a fault of some masons to lay foundation walls roughly on outside leaving projecting stone ends. This is bad and leads to leaking cellars. If either wall is rough it should be the inside face.)

WEDGING.—No wedging of joints above piers, etc., shall be done with wood—only slate shall be used. (Wooden wedges shrink as they become dry.)

* A "header" brick is one laid in the wall so that only its end shows, the *lengthwise of the* brick being at right angles with the face of the wall. A "*stretcher*" *is a* brick laid lengthwise of the wall.

RETAINING WALLS.—No retaining wall, unless otherwise specified, shall be of less average thickness than one-fourth of its height. They shall be battered back ¼" to foot of height and provided with "weepers" or drains near the bottom at intervals of 4 feet to carry off water.

PORCH AND VERANDA PIERS.—All porch and veranda piers shall go at least three feet below ground, and to the porch sills above ground. They shall have good foundations of concrete, and each shall be capped with a three-inch stone of the full size of the pier.

CHIMNEYS AND FLUES.—The chimneys shall be carried up as per drawings from the ground. Above the roof black cement mortar shall be used, and all smoke flues shall be surrounded with 8 inches of good brickwork and shall be lined on the inside with a burnt clay or terra cotta flue lining, from the bottom of the flue or from the throat of each fireplace continuously to the extreme height of the flue. The ends of such lining pipe shall be made to fit close together, and the pipe shall be built in as the flue or flues are carried up. All flues for fireplaces shall be of a capacity 8"x12," and the furnace and range flues shall also be 8"x12" inside capacity.

(Note, if 8"x8" flues be desired so specify.)

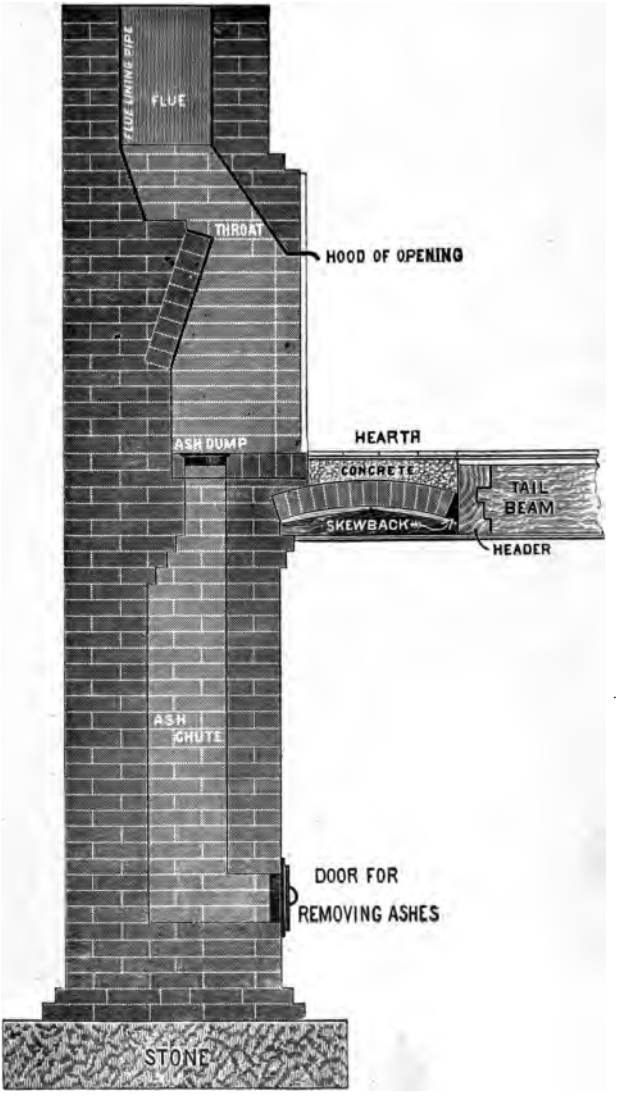
All flues which are not lined shall have struck joints; no parging or plastering will be allowed on the inside of any flue, see page 36. All flues should be lined, however, see page 33.

FIREPLACES.—Here limit height of fireplace—I advise 25 inches. The back of all fireplaces shall be inclined towards the front, beginning 6 courses of brick from the floor of the hearth, as per drawings (see diagram opposite) to secure a good draft, and the fireplaces shall be lined with firebrick, laid with close rubbed joints (or with cast-iron fireplace lining, as per design and pattern specified, if cast-iron is preferred.) The front opening of all fireplaces shall be supported by two iron bars ½"x2," nine inches longer than the width of the opening and shall be fitted with automatic ash dump grate. This to be furnished by mantel man.

Furnish and set proper iron thimble in furnace flue.

The tops of all chimneys shall be laid in black cement mortar and shall be capped with a three-inch cap stone, and the openings in the cap stone shall correspond in size with the dimension of each flue, so that no shoulder or other projection will extend over the opening.

HOW TO BUILD A CHIMNEY.



SECTION OF CHIMNEY SHOWING TRIMMER ARCH UNDER HEARTH, PROPER CONSTRUCTION OF FIRE PLACE, FLUE AND FLUE LINING, ASH CHUTE, ETC.

No chimney shall be enlarged where it passes the roof to form any overhang or projection over the roof.

The chimney walls from the cellar to first floor shall be carried up to form ash pits, securely enclosed with brickwork, these to have 12"x16" iron doors, with frame, in cellar, to be built in during construction. This contractor to furnish said iron doors.

No chimney shall be started or built upon any floor or beam of wood, and in no case shall a chimney be corbeled out more than eight inches from the wall, and in all such cases the corbelling shall consist of at least five courses of brick.*

All hearths are to be constructed with trimmer arches extending 20 inches from the chimney breast to a header beam, and the top of the arch is to be filled with two inches of concrete to the top of finish floor. Header beam resting securely in stirrup irons not less than half an inch thick to be furnished by carpenter and there shall be no wooden lath or furring on the chimney breast.

It will be observed, in the accompanying illustration, that the trimmer arch abuts upon a wooden "skew back" or wedge of wood, securely spiked to the header beam. This is necessary to secure a proper arch. If the footing of the arch comes squarely against the wooden header beam the shrinkage of the latter will in time release the arch and allow it to fall. It is unfortunately, however, the practice not only to omit this "skew back" but to omit the trimmer arch altogether, and to support the hearth directly upon the floor joists. This is a most dangerous construction, and a fire is only a question of time. It seems incomprehensible that an honest builder having any decent regard for safety to life would build in this way; and yet fires from this cause are frequent. My own Company was called upon to pay for damage done to a handsome dwelling where the builder had not only constructed the hearth in this way, but had actually swept the wooden shavings from the floors into the hollow spaces under the hearth. But for the fact that the fire was extinguished in time to discover this evidence of criminal indifference to human life the guilt of this builder, who was no better than a would-be murderer, would never have been known. The writer cannot too earnestly impress upon his readers again the importance of watching the construction of chimneys, hearths, etc. It involves small expense, but important consequences.

The range shall have a ventilating flue by the side of the smoke flue not less than 8 inches square, in addition to the smoke flue, which shall be not less than 8"x12," lined with tile.

* *This is a provision* of the New York Building Law, and it ought not to be *ted from in any* case.

RANGE.—The range will be furnished by the heater man and shall be set by him. It shall have a hearth projecting not less than three feet in front of the same and of the full width of the range, of best quality of rubbed slate 3" thick, (or stone or encaustic tile laid in a proper manner) to be furnished by this contractor.

The mantel over the range shall be of rubbed slate or stone, ten inches wide.

FURNACE PIT AND FOUNDATION.—This contractor shall lay the brickwork and concrete for furnace pit and foundation and the cold air box where same passes under the cellar floor.

BEAM FILLING.—This contractor shall beam fill all exterior walls between the beams with bricks laid in lime mortar to their top level same thickness as wall.

FIRE STOPS.—This contractor shall provide fire-stops at each story in all hollow walls and hollow partitions. He shall fill in solid between all upright studs or timbers to the depth of the floor beams with suitable incombustible materials, using, wherever possible, bricks and lime mortar for the purpose. Where it is impossible for any reason to use bricks and mortar he shall use sheet tin, which shall be carefully and closely nailed to prevent the passage of flame. (See illustration page 22.)

In all furred brick walls the course of brick above the underside and below the top of each tier of floor beams shall project the thickness of the furring, to more effectually prevent the spread of fire.

TILE HEARTHS AND FACES.—These will be furnished by the owner and set by the mantel man, the hearths upon concrete or masonry and the facings set to brick masonry.

CELLAR WINDOW AND DOOR SILLS.—All cellar windows and doors shall have sills of stone projecting at least two inches beyond the wall.

CELLAR BOTTOM.—(Note. If it is preferred to have the mason concrete the cellar floor the specification for this work contained in the plasterer's specifications should be inserted here. The concreting of the cellar should be the last work done, and after the building is secure from intrusion by other workmen, and for this reason it has been included in the plasterer's specifications. Not infrequently the mason does both the plaster work and the mason work, in which case it may be left in the plasterer's specifications.)

CISTERN.—This contractor shall build a cistern 12 feet in diameter and 12 feet deep, circular form, location as specified, in the following manner: A bottom 32 inches wider than the internal diameter of the cistern shall be constructed of concrete 12 inches thick, after the ground has been well settled and puddled with water; the concrete to be mixed in the proportions and manner hereinbefore specified except that there shall be two parts instead of three parts of clean sharp grit sand. When thoroughly set, the side walls of the cistern, 16 inches in thickness, shall be laid upon the outer edge of the concrete bottom to a height of three feet, from which point for a further height of three feet they shall be 12 inches in thickness, and thence 8 inches in thickness to the top, the top to be drawn in with bricks laid as headers eight inches in thickness to a 24-inch man-hole, which shall be surrounded by a brick curb and covered with a 3-inch flagstone or iron cover, with holes for ventilation.* The brick in walls up to arch of cover shall be laid in alternate courses of headers and stretchers—first a course of stretchers then one of headers.

All brickwork of cisterns shall be laid in Portland Cement and the whole of the interior and exterior shall be plastered with two parts of sand to one of Portland Cement, and after the cistern is finished the excavation shall be filled in carefully by puddling the returned earth with water and ramming hard every foot in heighth.

Note.—Much depends on doing this thoroughly, as the resisting strength of the cistern needs the sustaining pressure of the earth.

If it is desired to have a brick bottom, the cistern may be constructed with an inverted arch or concave bottom in the form of the bottom of a flask instead of concrete.

If the cistern exceeds 12 feet in diameter and 12 feet in depth the thickness of the side walls should be increased four inches for each four feet of excess over twelve in width or depth.)

CESS-POOL.—Build cess-pool, circular form, where specified, feet deep. Lay walls in brick, dry, 8 inches in thickness, or 18 inches (dry) if of stone. Draw in the walls towards the top to a man-hole two feet in diameter, the masonry of the arch top to be laid in cement mortar, and cover the man-hole with a flagstone three inches in thickness and a cast-iron vent pipe 4" in diameter.

* *The cover should be so secured as to secure ventilation without permitting access to the water by* insects, reptiles or malicious persons.

Return earth around sides when mortar is dry and ram each foot hard, settling with water. The bottom to be of earth.

If there is any way of draining a cess-pool it should be constructed with an inner and smaller chamber to retain the solids and permit the liquids to drain away. Be sure to have it far enough from the well.

SUPERINTENDENCE.—This contractor is to give his work his personal superintendence and is to keep a competent foreman constantly on the premises, and he is not to sublet the whole or any part of his work without the consent in writing of the owner.

PLASTERER SPECIFICATIONS.

SPECIFICATIONS OF PLASTERER'S WORK, for a Dwelling to be erected for JOHN DOE, ESQ., located at.....

These specifications are to accompany drawings, made by JOHN SMITH, Architect, under whose supervision the work is to be done.

The drawings and specifications are to co-operate, so that anything shown on the drawings and not mentioned in the specifications, or *vice versa*, is to be done, the same as if shown on the drawings and called for in the specifications. The drawings and these specifications, moreover, are to be carried out to the true intent and full meaning of the specifications.

In cases where there may be doubt as to exact measurements, or where the scale measurements differ from the figures, the figures are to govern, and the contractor is to verify all dimensions that relate to his work, or to the joining, fitting or adjusting of his work thereto.

He is also to take careful and exact measurements, and compare or copy wherever or whenever any new work is called for to be a counterpart of or similar to the present work; also to verify all measurements at the building whenever his work is subsequent to existing new work, and he is to be responsible for same, unless written notice is given by him to the architect, so that proper adjustments may be made in time.

This contractor must co-operate with all other contractors of the several works, so that work will not be constructed prematurely, necessitating its being taken down to allow the construction of work that should have been previously executed. He is also responsible for the proper adjustment of his work with other works, and to repair, join to and make his work perfect.

This contractor is to furnish all materials for the work herein specified, and they are to be, except where otherwise specified, the best of their several kinds, subject to the approval of the architect; also all tools, moulds, scaffolds, planks and plant necessary to carry out his contract.

All the work is to be done in the best manner, according to the full meaning of the plans and specifications, and subject to the approval of the said architect.

In case any materials are not approved they shall be promptly removed from the premises.

This contractor is to be responsible for any violations of the laws or ordinances, whether State or municipal, for the constructing of buildings, and is to hold the owner harmless from any expense or claims for damage to life, limb or property arising from any violation of such laws, ordinances or regulations, or caused by or in consequence of carelessness of himself or his employees.

This contractor is to examine all ceilings, partitions and side walls and to notify the carpenter of any necessary work to be done to conform to these specifications.

METAL LATHING.—He is to cover with expanded metal lathing (or wire lathing of Roebling patent or Clinton stiffened lath, or Stanley V-ribbed lathing, as may be preferred) all walls, ceilings, girders, soffits, window heads and wherever furred off with iron or wood furring, or wherever necessary to span other chases or iron work, if any, and fasten in a most substantial manner.

Wherever the wire lathing is attached to wooden beams it shall be fastened thereto with iron staples driven not less than one inch and a quarter into the beam.

It is best to use metal lathing on the soffits or under sides of staircases.

(Note.—Plaster boards or Mackite although more expensive than wood lathing and are better for fire stops and good work.)

WOOD LATHING.—Wherever wood lathing is specified the laths shall be the best quality of pine (spruce is cheaper but not so good) laths, and each lath shall be securely nailed to each stud. No lathing shall be permitted to extend behind the studding from one room to another, and the lath and plaster shall extend behind all wainscoting and skirt or base-boards and all panels under windows, *clear* down to the floor in every case. The laths shall be

well seasoned and of even thickness, sound, true, free from dead knots and bark. They shall be laid perfectly horizontal, at a distance of three-eighths of an inch apart, and shall break joints every six courses. All laths shall be laid horizontally and none shall be laid vertically or diagonally.

Do all lathing about window heads or elsewhere and about sky-light, curbs and stairways, finishing up the plastering in a proper and workmanlike manner.

The first coat of mortar for plastering shall be mixed with best, long goat or ox hair. It shall be well beaten and soaked before using, in the proportion of 2¼ pounds to a bushel of mortar (where King's Windsor Cement or Adamant plaster is used this specification not required) and the lime shall be slaked and mixed into the mortar with one part of lime to three parts of clean, grit, bank sand for two weeks before applying under shelter but no plaster shall be made or stacked in cellar.*

CORNICES, CENTRES, &c.—Moulded cornices, centres, etc., as per details and designs selected.

(Note.—It is quite customary nowadays to omit cornices in rooms, and centre-pieces; they add to the expense without materially improving appearances.)

PLASTERING.—(Note.–About three casks of lime, three single horse loads of sand and two bushels of good hair, with two thousand laths, are needed for a square of one hundred yards of three-coat plastering. With these quantities in mind an estimate can be made of cost.) The ceilings in cellar and all walls not furred to be plastered two coats; ceilings, partitions of all rooms, closets, light-shafts, furred walls and stairways and soffits throughout, from cellar to superstructure, to be plastered with three coats, the last or white coat to be troweled smooth and true. (If King's Windsor Cement or adamant plaster is to be used it should be so specified at this point.) "If King's Windsor Cement is used, it is to be mixed according to directions on barrel heads; the first coat to be properly applied with sufficient force to secure good clinches, and the white coat troweled and brushed to a smooth hard finish."

(Plastering should be and is usually applied in three coats. The first is called the "scratch" coat, which forms the clinch in the lathing. The second is called the "brown" coat, and the third or last is called the "hard" or "white" or "skim" coat. Where the plastering is on brick or stone walls, the scratch coat is usually omitted.)

* *The mixing* or stacking of wet plaster or mortar in the cellar of a building *is liable to seriously* injure the floor beams and the flooring of the first floor, and *should not be* allowed under any circumstances.

Run a Keene's Cement wainscot in all bath-rooms.*

Do all repairing and patching after carpenters, plumbers, electric-light men, marble masons, mantel setters, tilers and other workmen, and leave all places sound, clean and perfect at the completion of the building.

The cellar side walls are to be lime washed, two good coats.

BACK PLASTERING.—This contractor is to back lath and plaster between the exterior studs on all stories from sill to plate (carpenter to do the furring.) This to be one heavy coat, lathing to be as usual for King's Cement, adamant or similar plaster.

The fire-stop or brick nogging between inner plastering and outer sheathing, at each story, to be finished before back plastering.

CONCRETE CELLAR FLOOR.—This contractor is to level off cellar bottom, thoroughly settle and put down three inches of good concrete, the concrete to be made of one part good domestic Cement, brand selected by architect, one part clean sharp grit sand and five parts clean coarse gravel, or clean broken stone, not larger than will pass in every direction through a 2-inch ring, thoroughly washed; all to be by measure thoroughly mixed dry and water added afterwards. The finish coat to be one inch thick in addition to the above, and to be of equal parts of good Portland Cement and clean, sharp, grit sand, all worked up flush and true and protected until hard. The surface of the floor shall incline towards the drain for carrying off any water.

Clean mortar off all floors and windows and remove all rubbish from premises.

SUPERINTENDENCE.—This contractor is to give his work his personal superintendence and is to keep a competent foreman constantly on the premises, and he is not to sublet the whole or any part of his work without the consent in writing of the owner.

HEATING SPECIFICATIONS.

SPECIFICATIONS FOR HEATING, for a Dwelling to be erected for JOHN DOE, ESQ., located at.....

HOT AIR FURNACE.—This contractor is to furnish and set in the cellar of the house of John Doe one No, 524 Boynton New Gas-tight, Self-clearing Portable Furnace, having fire-pot 34 inches

* *The owner may* prefer, on account of expense, to have a wooden wainscot *of plain yellow pine* shellacked, or he may prefer, regardless of expense, to have *a marble wainscot.*

in diameter, heavy castings, fitted with all modern improvements and warranted to have a heating capacity sufficient to maintain a temperature in all rooms and halls having registers of 70 degrees in zero weather; furnished with galvanized iron casings, lined with corrugated iron, to prevent the heating of the cellar, and to be connected with the smoke-flue in the chimney with the best heavy galvanized iron pipe, fitted with patent damper to regulate draft. He is further to furnish all tin cellar heating pipes of best (one cross) tin and connect with the wall pipes of the house, and to furnish all registers required, (fourteen) in number, Tuthill & Bailey best standard make, of color and finish, as may be desired, and where they come in the floor or in contact with woodwork to fit same with slate or marble borders, all to have register boxes and casings.

All hot air pipes shall be provided with a damper or valve at the furnace and shall be of the sizes specified. The principal register shall be fastened open so that it cannot be closed. The heating pipes throughout the house to the various registers are to be constructed of the best (one cross) tin, and wherever they pass between floors or other hollow partitions are to be made double, with an air space of one-half inch between the inner and outer pipe. The wood studs nearest the pipe shall be lined with bright tin with air space. The lathing from stud to stud on both sides between which the pipes pass is to be of metal and no hot air pipe shall be nearer than three inches to any wooden studs and this contractor shall notify the carpenter as to studs between which hot air pipes are to pass to secure requisite separation. This contractor is to furnish said metal lathing and attach the same; and any hot air pipe entering a wooden partition or passing between a wooden floor and the ceiling below within ten feet of the furnace shall be made double and shall be wrapped with quarter inch asbestos board to a point fifteen feet distant from such furnace.

The furnace is to be set in a first-class and satisfactory manner ready for lighting the fire. It is to be set in the middle of the cellar as nearly as may be.

This contractor is also to furnish a cold-air box of 24 B B guage, galvanized iron of the best workmanship, double seamed and well braced, fitted with regulating damper so secured that the cold air cannot be cut off by negligence or otherwise, the outer opening to be protected with wire netting, and the inlet for cold air shall be so arranged as to supply an adequate amount of air to

the hot air chamber of the furnace and shall be at the top of the furnace between the cover of the hot air chamber and the cover of the furnace, in order to prevent the overheating of the furnace cover near the ceiling or woodwork.

The registers are to be set as follows:

First Floor.—One in dining-room, one in hall, one in parlor, one in library, one in butler's pantry. The registers in the parlor, library and hall are to be 12"x15."

Second Floor.—One in each of the four bed-rooms, one in each of the two bathrooms and one in the southern hall.

Third Floor.—One in the hall, one in the servants' bath-room.

This contractor is also to furnish a metal shield of galvanized iron one inch larger in diameter than the top of the furnace and suspend the same from the ceiling above the furnace so as to leave an air space between the shield and the ceiling.

PLUMBING SPECIFICATIONS.

PLUMBING SPECIFICATIONS FOR DWELLING TO BE ERECTED FOR JOHN DOE, ESQ., in accordance with Plans and Specifications prepared by JOHN SMITH, Architect, and attached hereto.

Note.—If the contract with the plumber is a separate one, then the general provisions applicable on page 91 as to masons should be included.

All pipes and other material to be of the best quality and the workmanship to be first-class.

The plumber will have no work outside of the house except to furnish and lay the main drain pipe to cess-pool or sewer. This to be of well burned, salt glazed vitrified pipe, 4 inches in diameter, laid as nearly as possible in straight lines, necessary curves to be of large radius, and joints to be made with best Portland Cement.

The main soil pipe of the house is to be 4 inch cast iron,* 13 pounds to the foot, connecting with the outside drain; to be thoroughly coated inside and outside with asphaltum before putting up. All joints are to be calked with oakum and melted lead; and it is to be secured in the strongest manner with stays and iron hooks. It is to be carried with Y branches for connection with various air traps straight through and two feet above the roof, protected at the top with ventilating hood and wire netting, and, where it passes through the roof, with a flange or flashing of 16-ounce tinned copper 18 inches square, properly soldered so as to protect the roof. (The vent at roof must not be less than 4 inches in diameter.)

* *Wherever* WROUGHT IRON pipes are run under ground they should be *galvanized.*

All service pipes are to be put on 1-inch plank strips. These to be furnished by carpenter, who is to do all cutting.

All the piping is to be arranged in plain sight, so as to be accessible for examination, and shall be carried from story to story in wooden ducts, to be made by carpenter, the cover secured with brass screws.

TANK.—This is best made of iron, but if of wood to be made by carpenter; this contractor in such case to line the tank with 16-ounce tinned copper, properly soldered, and 3-inch copper overflow through roof to nearest conductor is to be provided. There shall, also, be an emptying pipe at the bottom of tank.

The tank is to hold 500 gallons net capacity, measurements to be taken between the overflow and the top of the distributing supply pipe for the house.

FASTENINGS.—All lead pipes are to be secured with hard metal tacks and screws; hooks must not be used. All connections between iron and lead pipes through brass ferrules soldered to the lead pipes; calking with oakum run with molten lead. All joints in lead pipes are to be wiped joints. No cup joints allowed.

Hot and cold water pipes shall be kept one-half inch apart throughout the building.

All iron pipes to be secured in the strongest manner with iron hooks and stays.

SUPPLY PIPE.—Run 1½ inch A A lead pipe from tank to bath-rooms and other connections, leaving out branches for separate work as follows, viz: (name supplies you want.) There must be shut-off cocks in cellar for each Bath-Room, and for draining all the piping of the house. All pipes to be so inclined as to drain the entire system.

(It is important to have the main supply pipe of sufficient capacity to supply faucets when two or more are running at the same time in different parts of the house, as is often the case.)

WATER CLOSETS.—Use embossed pedestal closets manufactured by the Standard Manufacturing Co., of Pittsburg, with nickle-plated flush. This contractor is to set them properly and connect with soil pipes with 8 pound lead bends with brass floor plate. Cisterns to be supplied with ⅝ inch A A lead pipe.

Cisterns to be of paneled oak (or other preferred wood), and the seats of closets to correspond with cisterns.

TEST.—The contractor before plastering is finished is to plug up all openings in pipes and fill them with water, leaving them full for 24 hours, so that owner may see that all are tight.

PEPPERMINT TEST.—If it is desired to apply the important test of peppermint the specifications should read as follows:

When the pipes and traps are ready, the traps are to be filled with water, all air pipes and other outlets are to be closed, and the contractor is to pour six ounces of oil of peppermint into the top of the main soil pipe on the roof, and follow it with three gallons of hot water, immediately closing the top of the soil pipe. If any odor of peppermint is perceptible in any part of the house the plumber is, at his own expense, to search for and find the defects and repair them. After repairing, the test is to be repeated until everything is perfect. This test to be made in the presence of architect and owner or some person designated by owner. The peppermint oil is not to be carried through the house unsealed.

RANGE.—The plumber is to make connections for range between same and water back with 1" finished brass pipe and fittings, setting it in place; the mason to do the brickwork.

BOILER.—The plumber is to furnish a 63-gallon galvanized iron boiler, dome head, set on galvanized stand.

(Note.—It is true economy to have a good sized boiler, especially if there is more than one bath-room.)

(If copper boiler preferred, here specify.)

It is to be set in the proper manner by contractor and supplied with ¾ inch A A lead pipe; furnish ¾ inch sediment cock and ¾ inch A A lead pipe connected with nearest waste so as to empty boiler for cleaning. Place ¾ inch stop-cock on supply pipe and run a ¾ inch A A lead expansion relief pipe from top of boiler to top of tank.

Run a ½ inch A A lead relief pipe to hot water pipe at highest point and connect below boiler, inside sediment pipe and sediment cock, for the purpose of securing circulation of hot water rising from head of boiler.

There shall be no depression in any of the pipes.

KITCHEN SINK.—This to be of galvanized iron 18"x36."

(Note.—If enameled iron preferred, here specify.)

Supply through ⅝ inch A A lead pipe and 2-inch lead waste and DuBois trap.

Supply with hot and cold water through ¾ inch flange and brass thimble bibbs of finished brass, one bibb to have screw for filling.

Furnish back and air chamber, and support with brackets.

BUTLER'S SINK.—This to be of 16-ounce tinned copper 16"x24," with Italian marble 1¼ inch drip and back, as per plan.

Supply ⅝ inch A A lead pipe for hot and cold water. Furnish upright nickel-plated pantry cocks, together with nickel-plated chain, stay and plug. Lead waste pipe 2 inches, and 2 inch DuBois trap.

WASH TUBS.—Furnish three, Yorkshire, brown-glazed, wash tubs or trays in laundry, supplied with hot and cold water through ⅝ inch A A lead pipe, with ⅝ inch bibbs or faucets, 1½ inch brass plug and chain, 2 inch waste, with 2 inch DuBois traps to all sinks, connecting with main soil line through 2-inch cast-iron pipes. Trays to be supported with galvanized iron standards.

WASH-BASINS.—These to be oval 14"x17," marble Wedgewood ware, set in counter-sunk blue veined marble slab, with marble back 12" high and overflow. Furnish ½ inch silver-plated basin cocks, Fuller's patent, side lever, and nickel-plated plug, chain and stay. (If it is desired to do away with chain and plug on account of cleanliness, the "standing waste with concealed overflow" may be specified.) Hot and cold water pipes to be ⅝ inch A A lead with 1½ inch waste and 1½ inch Sanitas traps, all safely and properly connected with soil pipes. Slabs to be supported with nickel-plated brass brackets.

Slop sinks, shown on plan, to be of enameled iron, placed where shown. (If galvanized preferred for cheapness, here state.) Hot and cold water supplied through ½ inch brass bibbs, with 2 inch D lead waste and 2 inch DuBois traps.

BATH-TUBS.—These to be five feet long, except the third floor tub, which is to be 4 feet 6 inches; best quality of enameled iron, manufactured by the Standard Manufacturing Co., of Pittsburg. Hot and cold water to be supplied through ⅝ inch strong lead pipe, nickel-plated brass bibbs, No. 4½, and empty through 2-inch lead waste and 2-inch DuBois traps into main soil pipe. Plugs, chains and chain stays and other fixtures to be nickel-plated. Overflow connections shall branch into dips of traps.

The outside of bath-tubs shall have two coats of best enamel paint, with gold band. This work by painter.

VENTILATION.*—Back Air Pipes. Furnish lines of 2 inch lead pipe or 2-inch iron pipe from crowns of each trap and continue to points two feet above waste connections, where connect with main soil line by branches. Ventilate with McClelland anti-siphon vent for distances exceeding four feet, vents to be located near fixtures and connect with crown of trap of 1½ inch pipe.

* *See a very instructive treatise, "Plumbing Simplified," by Wm. Paul Gerard, C. E.*

EXPOSED PLUMBING.—All plumbing pipes, including traps, to be exposed and to be neatly silvered at completion.

TRAPS.—The wastes of all lines to be trapped with separate Sanitas or DuBois traps. Access to traps shall be had through pockets made in floor, and plumber is to see that carpenter under his contract does this work properly.

FLASHING.—All pipes passing through roof shall be flashed with 16 ounce tinned copper 18 inches square, (or 4 lb. lead, if cheaper desired,) so secured that no leak shall occur.

BIBBS.—Connect all bibbs properly; also all cocks for wastes and shut-off.

CHAINS for all fixtures to be No. 2 nickel plated.

JOINTS.—All soldered joints are to be wiped joints.

WEIGHTS OF LEAD PIPES.—All lead pipes used shall weigh per lineal foot:

SUPPLY PIPE.		WASTE AND VENT PIPE.	
½ inch,	2 lbs.	1 inch,	2 lbs.
⅝ "	2¾ "	1¼ "	2½ "
¾ "	3½ "	1½ "	3½ "
1 "	4¾ "	2 "	4¾ "

Note.—If it is desired to have brass hot water pipes specifications should so state. They are better than lead but cost more.

GAS-FITTING SPECIFICATIONS.

The house to be piped for gas in the best and most thorough manner and in accordance with municipal regulations, if any there be, or with the regulations of the Gas Company, and in accordance with the following specifications.

OUTLETS shall be as indicated on plans, all piping to be of best wrought iron, and all fittings malleable galvanized iron.

If the lighting is to be by Springfield Gas Machine, the piping shall be in accordance with the rules of said Springfield Gas Machine Company.

All pipes are to be connected with red lead, capped, tested and proved perfectly tight before plastering is finished in the following manner:

Caps shall be put on and the whole system made air-tight. Air shall then be forced into the pipes at a pressure which will raise a column of mercury at least six inches high in a glass tube. This height shall be maintained for at least 30 minutes.

Pipes shall be of the following sizes:

GREATEST NUMBER OF FEET TO BE RUN.	SIZE OF PIPE.	GREATEST NUMBER OF BURNERS TO BE SUPPLIED.
20 feet	⅜ inch.	2
30 "	½ "	4
50 "	¾ "	15
70 "	1 "	25
100 "	1¼ "	40

Piping shall be substantially secured in place with iron hold-fasts. All centre pipes shall rest on solid supports secured to timbers near their tops. Side wall brackets shall be from the floor to outlet and in no case shall descend from overhead pipes.

(Note.—This is necessary to secure return of condensed material, gasolene, etc., to meter or gasolene tank.)

All branch outlet pipes shall be taken from the sides or tops of running lines; never from the bottom. Bracket pipes shall be 5 feet 6 inches from floor, except in halls and bath-rooms, where 6 feet. Nipples shall not project more than ¾ inch from face of plastering. (As lath and plaster are about ¾ inch thick, this would mean 1½ inches from face of studding.)

No floor timbers shall be cut except where necessary, and then by carpenter only, and no timber shall be cut at a greater distance from bearing than two feet, nor shall the timber be notched for a greater depth than 1¼ inches.

No gas-fitters' cement shall be used under any circumstances.

Gas pipes must not be placed at bottoms of floor joists where they cannot be examined. Pipes shall be run for Gas Logs where marked.

This contractor is to see that the whole system of piping shall be so arranged as to drain perfectly to the meter or gasolene tank, leaving no obstruction in pipes by shoulders, depressions or otherwise to prevent perfect drainage of the system.

SPECIFICATIONS FOR ELECTRIC-LIGHT INSTALLATION.

This contractor is to properly wire the building throughout for electric lighting, with outlets as shown on plans; materials to be of the best quality and workmanship; furnishing all wires, conduits, switches, cut-outs, etc., so that the installation will comply in all respects with the requirements of the National Board of Fire Underwriters; and until this contractor furnishes a certificate from the local board of underwriters having jurisdiction of the territory in which the building is located that said installation

is in accordance with the rules no amount shall be payable under this contract.

Note.—If it is desired to install conductors or wires in raceways or conduits so that they can be removed or replaced from time to time, if necessary, (the best method of installation) it should be here stipulated and the particular raceway or conduit to be used must be mentioned. Where wiring is not used with a conduit, the Attix wire is a very safe article. It is best to require that all installations shall be in accordance with the rules of the underwriters, as new precautions for safety are discovered from time to time and the underwriters keep abreast of such improvements, and their rules are always up to date.)

TINNING AND COPPERSMITH SPECIFICATIONS.

These, if it is intended to have a separate contractor, should specify the material to be used for angles, valleys, ridges, ridge-rolls, decks, finials, etc.,—whether tin, zinc, lead, galvanized iron or copper. They should provide that all places which require flashing shall be flashed, whether specified or not, and should provide that all leaks shall be stopped after other workmen, and everything left water-tight at completion of the building.

PAINTER'S SPECIFICATIONS.

All of the paint, oil, turpentine and other materials to be of the best quality.

All hard wood floors and borders are to have one light coat of linseed oil and to be finished with hard wax, applied in the best manner, thoroughly rubbed in. All other woodwork to be finished with an oil filler, rubbed down with O O sand paper, with two coats of Murphy's (or Pratt's) wood finish varnish, neatly rubbed with pumice-stone and water to a smooth dead finish. All hard wood to be given the same treatment, except that it is to have a coat of Wheeler's filler and an extra coat of varnish. (If any other make than Wheeler's is preferred it should be stated.)

Owner to select color of paint for inside and outside work. (This is a matter as to which tastes vary, and the owner with his architect will have to draw the specifications in each instance.)

GLAZING—This is usually a part of the carpenter's work, but if to be done by the painter the quality of glass and sizes of lights should be specified. For ordinary, cheap dwellings, "stock" sash are the least expensive; that is, the sizes kept in general stocks.

The specifications should require that all glass "shall be well bedded, tacked, puttied and back puttied."

SPECIFICATIONS FOR ELECTRIC BELL AND SPEAKING-TRUMPET WORK.

This is generally included in the carpenter's specifications, and should require that electric bells shall be placed, with push buttons, in the various rooms desired, with an annunciator in the kitchen, the push buttons to be of pearl, nickel-plate or plain metal, as desired.

It is well in addition to the bell from the front door to the kitchen, connecting also with the servants' rooms, to have a bell from the owner's bed-room, near the head of the bed, to the kitchen and to the servants rooms; one from the dining-room, with a push button attached to the chair; one from the lounge in the library or sitting-room to the kitchen (where the mistress of the house is indisposed this will be found convenient, and possibly save her an uncomfortable walk across the room to touch the button to summon a servant,) and one from both the library and the owner's bed-room to the stable.

A speaking trumpet to the stable, and also to the cellar near the furnace, will be found convenient.

It is also well to have a bell from the spare or guest's room to the kitchen.

Where the house is not conveniently near to a mechanic understanding electric wiring the specifications should require that wires for pull bells shall run through small lead conduits in the plastering.

GENERAL FORM OF CONTRACT FOR THE ENTIRE WORK.

The following contract has been carefully prepared, with the best legal advice. It will suit any form of construction, even that of an elaborate fire-proof building, no matter what its purpose or occupancy, while most of the requirements are applicable to the cheapest construction. It leaves little or nothing to memory or verbal understandings, which are always dangerous; and while it may be regarded as longer than necessary, there is not a paragraph in it which has not been carefully considered in the light of experience and which is not intended to prevent misunderstandings, disputes and litigation.

EQUITABLE CONTRACT.

It ought not to be necessary to suggest that an owner who expects fair dealing at the hands of his contractor should be perfectly fair with him, and that he should avoid all tricky clauses in his contract. Such clauses are sometimes inserted with "drag net" intention to cover any possible laches or neglect on the part of the architect and the owner. The following clause, for example, ought not to be inserted :

"The contractor will also do any and all patching where the work is damaged by other mechanics and for ANY CHANGE THAT MAY BE MADE BY THE OWNER OR ARCHITECT, no matter how much is done, make all work good, without any extra cost to the owner whatsoever."

An honest owner would not put such a clause in his contract, and an intelligent contractor would not consent to it, unless he is as dishonest in his intentions as he is shrewd in his interpretation.

Another objectionable clause is the following:

"Any work shown on the drawings and not mentioned in the specifications, or vice versa, must be done by the contractor without any extra cost to the owner, and (here comes the objectionable part) ANYTHING NECESSARY TO COMPLETE THE JOB, WHETHER HEREIN STATED OR NOT, SHALL BE DONE WITHOUT EXTRA CHARGE."

It was good advice given by an honest man to his son on starting out in life: "Never be half as sharp as you know how to be." The man who digs a pit for his neighbor deserves to fall into it himself. Endeavor to draw the contract so that it will be just to both parties and thoroughly plain in its terms and meaning. It is an old rule of law that if anyone should suffer for want of a clear and unmistakable contract it should be he who has the drafting of it. It is a fundamental law of contracts as old as the writing of Vattel in his "Law of Nations," that "if he who could and ought to have explained himself clearly and plainly has not done it, it is worse for him; he cannot be allowed to introduce subsequent restrictions which he has not expressed."

It is, therefore, most important in the interests of all parties that the contract and the specifications should be explicit and omit nothing which would define the duty of the owner, on the one hand, or insure honest work and good construction, on the other. There are some builders who cannot be relied upon to call the owner's

attention to oversights or mistakes in architect's specifications; they prefer rather to take advantage of the loopholes which they perceive for cheating. For this reason defective, indefinite and carelessly worded specifications generally result in securing a tricky and dishonest contractor, who becomes the successful bidder. A conscientious bidder, who knows how and intends to do good work, bases his estimate on his intention and makes his figures accordingly, while the sharper, seeing opportunities for cheating, underbids honest competitors, secures the job and a poor building is inevitably the result. Do not fail, therefore, to specify fully all work required and the manner in which it is to be done, leaving nothing whatever to verbal understandings.

GENERAL FORM FOR CONTRACT WITH BUILDER.

AGREEMENT made this fifth day of November, 1896, between: JOHN DOE (hereinafter called the owner), party of the first part, and RICHARD ROE, of the City of New York, (hereinafter called the Contractor), party of the second part, WITNESSETH:

That the owner and Contractor, for and in consideration of the sum of One Dollar each to the other in hand paid and other valuable considerations, the receipt whereof is hereby acknowledged, have agreed as follows:

FIRST: The Contractor agrees to do and perform all the work and furnish and supply all the materials required to finish and complete the mason work, carpenter work, iron work, exterior marble, interior granite, elevators, interior marble, steam, (if any) heating and ventilating apparatus, marble and tiling work, plumbing and gas fitting, terra cotta and plastering, painting, speaking tube and bell work and hardwood finish, mentioned and referred to in and called for by the drawings and specifications made by JOHN SMITH, Architect, and signed by the owner and Contractor relating to the building to be constructed and erected on lots belonging to said owner and known as.....

in the City of New York, which drawings and specifications are hereto annexed and made a part of this contract, in consideration of the payment to the said Contractor by the said owner of the sum of Dollars, at the dates and in the manner hereinafter provided. And the Contractor further agrees to perform the work aforesaid in a good and workmanlike and substantial manner, under the direction and to the satisfaction and approval of the said JOHN SMITH, Architect, his successor or successors.

SECOND: The Contractor further agrees that all materials furnished and provided by him shall be of the kind and quality described in said Specifications, and further agrees that all materials required to be furnished and supplied which are not described in said Specifications shall be of the best quality and shall be approved by said JOHN SMITH, Architect, his successor or successors.

And the Contractor further agrees to furnish whatever temporary heat may be necessary to keep the enclosed parts of the building above the freezing point during the performance of this contract, at his own expense and without extra charge; and further agrees to furnish all elevators and hoisting apparatus that may be necessary or required for the due performance of the work called for by this contract and run and operate the same at his own expense and without extra charge.

THIRD: The Contractor agrees to begin work under this contract on the first day of January, 1897, and to fully perform, complete and finish all work and furnish and supply all materials embraced in this contract and said drawings and specifications in strict accordance with the terms and requirements of this contract and said drawings and specifications by the first day of June, 1897, and that in the event of his failure so to do, he will pay to the party of the first part, as liquidated and stipulated damages, and not by way of penalty, the sum of Fifty Dollars ($50.) for every day that the work called for by this contract shall remain uncompleted and unfinished, subsequent to June 1st, 1897, up to and including the 15th day of July, 1897, and will pay to the owner the sum of Fifty Dollars ($50.) a day as liquidated and stipulated damages, and not by way of penalty, for every day that the work called for by this contract shall remain uncompleted and unfinished, subsequent to said 15th day of July, 1897; and the said contractor further agrees that the said owner may deduct and retain said liquidated and stipulated damages out of any

moneys due him under the terms of this contract at the date said damages, or any part thereof, shall accrue, or out of any moneys that may thereafter become due to said contractor under the terms of this contract.

As already stated, penalties are difficult to collect. If the plan suggested of stipulating for a bonus is decided upon, the following should be the wording:

"The contractor agrees to begin work under this contract, on the first day of January, 1897, and to fully perform, complete and finish all work and furnish and supply all materials embraced in this contract and said drawings and specifications, in strict accordance with the terms and requirements of this contract and said drawings and specifications, by the first day of July, 1897; but it is further understood and agreed that, in the event that he shall complete the building and comply with all of the terms and requirements of this contract as above specified by the first day of June, 1897, he shall receive a bonus of fifteen hundred dollars, or at the rate of fifty dollars per day for every day of earlier completion than the first day of July above specified, not exceeding in all the sum of $1,500 if completed by the first day of June as aforesaid.*

FOURTH: The Contractor agrees that he will, at his own expense, provide and furnish any and all materials, (including water) labor, scaffolding, tools, implements, moulds, models, and cartage, of every description, necessary to the due performance of said work and the full and complete performance of this contract.

FIFTH: The Contractor further agrees that he will proceed with the said work, and every part and detail thereof, in a prompt and diligent manner, and at such reasonable times as may be necessary and proper in order to complete and finish the same, and every part and appurtenance thereof, in a durable and substantial manner, on the said 1st day of June, 1897, (if bonus form above, should be July 1st,) and without the performance of any part of the said work in unsuitable weather.

SIXTH: The Contractor further agrees that he will not at any time suffer or permit any lien, attachment or other incumbrance under any law of this State, or otherwise, to be put or remain on the building or premises upon which the aforesaid work is to be done and for which the aforesaid materials are to be

* *If the contractor declines to agree to this, it may safely be assumed that he sees the loopholes in the usual penalty clause and expects to escape them.*

furnished under this contract for such work or materials, or by reason of any claim or demand against him, the said contractor, and that should any such lien, attachment or incumbrance be placed or filed upon said building or materials, the said contractor shall not, until such lien, attachment or other incumbrance shall be removed, satisfied and discharged be entitled to claim, demand or receive any payment whatever under or by virtue of this contract.

SEVENTH: The Contractor further agrees that the plans, drawings and specifications hereinbefore mentioned are intended to co-operate, so that any matter or thing contained or shown by one and not by the other shall be of the same force and effect as if contained in and shown by both; and that he will perform any work, and furnish all materials shown by either without any extra charge, claim or demand whatsoever.

EIGHTH: The Contractor further agrees that the owner may at any time during the progress of the work alter, change, deviate from and add to said drawings and specifications, and that any such alteration, change, deviation or addition shall in no way affect the validity of this contract. Provided that if such alterations, changes or deviations or additions shall decrease the aggregate cost of said work and materials then the amount of such decrease in cost shall be deducted from the said sum of $ and the said owner shall only be liable to pay to the Contractor the balance remaining after making said deductions as aforesaid and provided further that if such alterations, changes, deviations or additions shall increase the aggregate cost of said work and materials beyond said balance remaining after making the deductions aforesaid, then the said owner shall pay to the said Contractor the amount of such excess in cost with ten per cent on said excess in addition to said balance.

NINTH: And the Contractor further agrees that he shall not be entitled to claim, demand or receive any pay for extra work, unless the necessity for such extra work shall be certified to by the said JOHN SMITH, or his successor or successors, in writing; and the price to be paid for such extra work shall have been fixed and determined before the same shall have been performed by a written memorandum ordering the extra work to be done and stating the price to be paid therefor, signed by the owner.

TENTH: The Contractor further agrees that if he shall, at any time, neglect or refuse to supply a sufficient number of workmen of requisite skill, or to furnish materials of the kind and quality called for by this contract and said specifications, or shall fail in any respect to prosecute the said work with promptness and diligence, or shall be in default in the performance of any covenant in this contract contained on his part to be kept and performed for the period of three days after notice in writing, signed by the owner, of such default shall have been served upon him, either personally, or by leaving the same at his residence or place of business, then, and in such event, the said owner shall have the right and power to employ other persons to perform the work and furnish the materials required by this contract, and to complete the same in every respect, and the cost and expense thereof at the reasonable market rates in excess of the unpaid balance of the contract price shall be a charge against him, the said Contractor, and he will pay the same to the said owner; and he, the said Contractor, shall have no claim or demand against the owner for said unpaid balance or by reason of the non-payment thereof, and the said owner and all persons employed by him to complete the said contract shall have the use of all scaffolding and fixed tackle of any kind belonging to, or used by, the said Contractor prior to said default on his part, free of charge, and until the said contract shall have been fully performed and completed.

ELEVENTH: The Contractor further agrees that the said JOHN SMITH, or his successor or successors, may condemn any materials furnished and reject any work performed under this contract, and require the same to be taken down and removed from the premises by and at the expense of the said Contractor; and that said JOHN SMITH, and his successor and successors, may also direct the time of doing the several portions of work called for by this contract.

TWELFTH: The Contractor further agrees that no certificate given or payment made under this contract shall operate as or be held to be an admission on the part of the owner that this contract, or any part thereof has been complied with, or that any detail of the work has been properly performed, or that the materials furnished are of the quality called for by the specifications, in case the fact shall be otherwise; nor shall any such certificate or payment stop or preclude the said owner from claiming damages against the said Contractor, should the work

and materials hereby required not be performed and furnished in every particular in a substantial and workmanlike manner and in strict fulfilment and compliance with the requirements of this contract and said drawings and specifications.

THIRTEENTH: The Contractor further agrees that he will bear and be liable for all loss or damage that may happen to the said materials by fire, storms or otherwise, prior to the time they have been actually used and entered into the construction of said building and that he will repair all damage and injury to said work and materials occasioned other than by fire, storms or otherwise, during the performance of this contract and prior to the completion and acceptance of the same and without extra charge.

FOURTEENTH: The Contractor further agrees to indemnify and save harmless the said owner from all and every claim of damage or injury to person or property occasioned by his negligence, carelessness or want of skill, or that of his servants or employees, or that of his sub-contractors or their employees, while engaged in the performance of the said work, or otherwise; and further agrees to indemnify and save harmless the said owner from every claim and demand for the violation by him, his servants, or sub-contractors and their servants, of any Statute or municipal ordinance regulating or relating to the work called for by this contract; and further to indemnify and save harmless the owner from all damage or injury occasioned by his negligence, carelessness or unskillfulness, or that of his sub-contractors, or his or their servants or employees, in supporting, protecting or shoring up of the adjoining walls or buildings.

FIFTEENTH: The Contractor further agrees that in case the said JOHN SMITH shall die, resign, be removed or refuse to act, then the said owner may appoint a successor or successors, and such successor and successors shall have like power and perform like duties as are conferred and imposed upon the said JOHN SMITH by this contract.

SIXTEENTH: The owner agrees to pay to the Contractor for performing said work and furnishing and supplying said materials as aforesaid the sum of Dollars in instalments as the performance of this contract progresses and as follows: On the 25th day of each and every month the Contractor shall furnish to the architect or his successor or successors a statement of the work done and the materials furnished during the thirty days next preceding, and thereupon the architect or his

successor or successors shall verify said statement and furnish to the Contractor a certificate in writing signed by him of the value of the work done and materials furnished and supplied and actually used and applied in the construction of said building during said preceding thirty days, and upon the presentation of the said architect's certificate the said owner will pay to the Contractor eighty-five per cent of the amount so certified by the architect and will make such payment within ten days after the presentation of such certificate as aforesaid. When the last installment shall be certified to by the architect, there shall be added to the amount so certified the aggregate of the fifteen per cent deducted from the prior instalments, and the amount of the said instalment with such additions shall be paid to the said Contractor by the said owner when and not before the said Contractor has complied with the conditions mentioned in the next succeeding paragraph of this contract.

SEVENTEENTH: The Contractor agrees that he shall not be entitled to demand, receive, sue for or collect the amount of said last installment or any part thereof until he has presented to the said owner the certificate in writing, signed by the said JOHN SMITH, his successor or successors, to the effect that this contract has been fully completed and performed and also the certificate of the County Clerk of the County of that no mechanics or other liens are of record upon said building, for work done or materials furnished by any person or persons for or on behalf of said Contractor or any sub-contractor or his or their employees and also only upon evidence being furnished by the Contractor satisfactory to the owner, that no claim or demand exists in favor of any person or persons for work done or materials furnished or supplied in the performance of this contract.

EIGHTEENTH: It is further mutually agreed between the Contractor and owner that should any dispute or question arise respecting the true construction or meaning of the drawings or specifications, the same shall be decided by JOHN SMITH, his successor or successors, and his or their decision shall be binding and conclusive. But should any dispute arise respecting the cost of any change, alteration, deviation or addition with respect to the work to be done and the materials to be furnished under this contract, the same shall be submitted to two arbitrators, one to be chosen by the Contractor and the other by the owner, whose decision if they agree shall be final and conclusive, and who in case

they cannot agree shall have the power to choose a third arbitrator, and the decision of the three arbitrators or a majority of them shall be binding and conclusive upon the said owner and the said Contractor.

NINETEENTH: It is further mutually agreed between the owner and Contractor that the owner shall not in any manner be answerable for any loss or damage that shall or may happen to the work done or materials furnished under this contract during the performance thereof, or for any loss or damage that may at any time happen to the materials, tools and appliances used and employed in the performance of the work called for by this contract.

TWENTIETH: It is further mutually understood and agreed between the owner and the Contractor, that the Contractor shall have the right to make sub-contracts but only with such person or persons, corporation or corporations as shall have been first approved in writing, signed by the owner and that the Contractor shall not assign this contract or any interest therein without the consent of the owner in writing shall have been first had and obtained; it being understood and agreed that this contract is for the personal service and skill of the said Contractor and that if such Contractor shall make any such assignment without such consent, then at the option of the owner this contract shall cease, determine and be null and void.

TWENTY-FIRST: This contract shall bind and inure to the benefit of the owner, his successor or successors, and the Contractor, his heirs, executors and administrators.

FIRE INSURANCE.—It is usual to insert in the contract a provision that the owner shall maintain fire insurance, payable both to himself and the contractor, as interest may appear. Insurance should be taken also against tornado and lightning. If it is desired to have an insurance clause it should read as follows:

"Insurance shall be maintained by the owner in the joint names of the owner and this contractor, loss, if any, payable as interest may appear, during the process of the work, and to 80% of the value thereof, in the following form:

John Doe and Mary R., his wife, as owners, and Richard Roe, as contractor; loss, if any, payable as interest may appear."

IN WITNESS WHEREOF, the Contractor and owner have caused these presents to be duly executed the day and year first above written.

JOHN DOE, Owner.
RICHARD ROE, Contractor.

SCHEDULE.

It is understood and agreed that, in accordance with the terms of the agreement dated the fifth day of July, 1897, between JOHN DOE, as owner, and RICHARD ROE, as Contractor, the following alterations, changes, deviations and additions have been made to the said contract and the original drawings, plans and specifications thereto annexed, in accordance with the terms of the contract, and that these changes have occasioned an increase or decrease in the contract price in the sum or amount stated respectively in the column below headed "Increase" or "Decrease."

CONTRACT WITH ARCHITECT.

This agreement between JOHN SMITH, Architect, and JOHN DOE, Owner, entered into this....day of.....

WITNESSETH, That the said JOHN SMITH is to draw plans and specifications of a dwelling to be erected for the said JOHN DOE at..... The drawings are to be complete and to include front, rear and side elevations to scale ¼" to foot, details of standing trim, framing and joining plans, etc., plans of foundation and all floors, roof and attic plans, together with all other necessary and proper papers and drawings,—four copies of each, before.....189.... and before taking estimates, in order that each one estimating may know what will be required. The said plans and drawings are to be the property of the said JOHN DOE, Owner.

Said architect is further to give supervision to the work throughout its progress, to visit the premises at least once every day and carefully inspect every portion of the building. He is further to furnish a superintendent who shall spend at least two hours every day at the building. He is to carefully inspect and test all material and finished work and to protect the interests of the owner in every way.

In consideration for which service the said JOHN DOE is to pay the said JOHN SMITH, on the completion of the drawings, plans, specifications, details of standing trim, framing plans, etc., the sum of ..... dollars, and the further sum of....per cent on the money due and payable to various contractors under their contracts, said percentage to be payable at the time payments under said contracts are by their terms due and payable.

Witness our hands and seals this....day of.....in the City of.....

(Signed) JOHN DOE. (L. S.)
JOHN SMITH. (L. S.)

RECAPITULATION.

Note.—The following summary of points to be observed in building a house has been prepared to enable an owner to check off his plans and specifications, to see that all of the points explained in this book have been provided for, as per suggestion on page 42. To enable him the better to understand the brief references here given, the page of the book where the matter is more fully explained has been inserted. In the absence of such page reference the reader can easily find the text by the index. He will do well, however, to compare the phraseology of his specifications with that used in the book, pages 69 to 116.

GRADING.—Dig trenches 8 inches wider than walls and prepare footing courses, page 94.

Remove and preserve top soil and loam.

If house is on sidehill build wide rather than deep, page 9.

Locate dining room according to prevailing breeze in summer, page 10, 44.

Provide blind drains around foundation, page 12.

Provide double system for carrying surface water—gutters and subsoil pipes, page 10.

MASONRY.—Specify quality of bricks, page 94.

Provide for laying bricks in freezing weather dry and warm in cement mortar; in non-freezing weather wet, p. 15, 16, 92, 93, 94.

Lay foundation walls in cement mortar.

Plaster outside with cement and asphalt, page 95.
Have footing courses, page 95.
If stone walls, have both sides brought to face, especially side next earth bank, p. 95.
Retaining walls. Thickness should be at least one fourth height.
Provide weepers, page 96.
Should be battered back against bank.

CELLAR.—Have high underpinning or areas to secure windows giving light and ventilation, page 14, 89.
Should be full size of house, page 12.
Should have ceiling 8 feet high.
Ceiling should be plastered on wire lathing, page 12.
Provide for two coats white-wash on side walls.
Concrete floor, page 94, 104.
Provide drain in floor before laying concrete or building wall.
Avoid partitions in cellar or wooden pillars, p. 76.
Provide interior carrying walls rather than piers, p. 76.
Provide for coal bins, wine closets, cold room with wire netting, page 90.

FRAMING.—Provide for balloon frame or braced frame, pages 17, 73, 74.
Provide for angle braces.
Cross bridging between floor joist or beams, pages 19, 76.

SHEATHING.—Should be tongued, grooved and thicknessed.
Nail horizontally, pages 20, 80.
Cover with heavy building paper, nailed with tin washers.

SIDE WALLS.—Cover with shingles or clapboards; cedar shingles best; clapboards to be sap extra.
Use galvanized nails.

BACK PLASTERING.—Provide for in wooden houses, pages 17, 20, 104.

SHRINKAGE.—Keep equal thicknesses of timber under footing of parallel partitions, pages 18, 19, 77.
See that partition studs do not set on floor joists, but that they pass through and foot on partition below.

FIRE-STOPS.—Provide in all hollow partitions, spaces in side walls, furred walls and staircases, pages 21, 22, 23.

FLOOR JOISTS OR BEAMS.—Should be 3"x12."
Yellow pine, spruce or hemlock, in order named as to cost and desirability.

FLOORS.—Should be double. Lower of hemlock $\frac{7}{8}$"x6," tongued and grooved.

Under flooring should be nailed diagonally, except for parquette flooring.

Carry under-floor to outer sheathing to support fire-stop, p. 82.

Upper floor may be of oak, maple, comb-grain Georgia pine, North Carolina pine, white pine or spruce, according to expense.

Specify clear lumber, time-seasoned or kiln-dried—the former best.

Provide for sorting, to put best on hall, library, parlor, and dining-room.

Put Salamander between flooring, page 26.

Sweeping mouldings—provide for p. 27, 84.

Deafening—provide for this, especially servants' floor, p. 27, 82.

Provide mitred borders for hearths, page 82.

Base knobs and door stops, page 83.

PIAZZA.—Have 12 feet wide if possible and extend part way around sides, page 27, 81.

Avoid sap lumber in flooring, page 81.

Incline floor to front $\frac{1}{4}$ inch to foot, page 81.

Putty joints between base of columns and floor, p. 29.

Make tight joint at house wall.

Columns.—Specify solid natural wood or white wood to be painted or boxed columns, as desired.

Have balusters in railing large enough.

Avoid resting places at eaves for birds' nests, etc.

Make outside steps of strips or bore with auger holes to prevent warping, pages 28, 84.

ROOF.—Should be well braced, pages 29, 30, 31.

Should be sheathed with 6" tongued and grooved hemlock.

Cover sheathing with heavy roof paper, nailed with tin washers.

If shingle roof, nail shingles on shingling strips, to prevent rot.

Lay shingles 5" to weather, page 81.

Do not lay shingles in lead paint; it rots them. If painted at all they should be painted on top as they are nailed, p. 81.

If dipped in creosote, should be drained dry before nailing.

Nail shingles with galvanized nails, wide heads.

Slate.—If slate roof, should be laid in mortar, 7" to the weather, 9"x18," square ends, page 80. Round ends cost more and do not look any better.

Avoid lodging places for snow on roof by making "crickets," if necessary, page 32.

GUTTERS.—Should be copper, or if wood, lined with metal, page 86.

Fasten with galvanized iron hangers.

Furnish and insert basket ball leaf arresters of copper wire in gutter openings of leaders.

Should be below line of snow fall, pages 86, 87.

LEADERS AND CONDUCTORS.—Better of copper or galvanized iron; at least 3" in diameter, page 87.

ATTIC.—Should be ventilated, page 30.

Paint woodwork with fire-proof paint.

FLASHING.—Use copper, zinc, lead, tin, according to expense; copper cheapest in long run, page 87.

See that specifications require that flashing is carried well under shingles and slate and up sides of chimneys, page 32.

RIDGE BOARD AND RIDGE ROLL, FINIALS, ETC.—Should be copper, page 32.

BALCONY DECKS.—Use lead or zinc instead of painted canvas or tin, page 32.

Have wooden slat floor, for walking, page 32.

Should incline to throw water from building.

CHIMNEYS.—Should be built from ground; never from floor joist. If corbeled out of brick walls should be not over 8 inches from wall and by five courses of brick corbel, p. 98.

Make walls of flues 8" thick.

Line with burnt fire clay lining pipe, page 33.

Be sure to have enough fire-places, page 33.

Incline back of fire-place forward, to insure draft.

Make flues large enough—8"x12" for wood fires and furnace.

Carry up flues as straight as possible, page 35.

Cope chimneys with stone, page 35.

See that openings in cap stone are as large as flue openings, before hoisting to to top of chimney.

Avoid overhang or enlargement of the chimney at the roof, page 35.

Use only cement mortar in brickwork of chimneys above roof (only cement mortar will stand the weather.) The joints will look better if cement is colored black.

Do not allow any parging or plastering on inside of flues, p 35.

Provide for ash pits, they cost nothing, p. 98.

FIRE-PLACES.—Should not be too high, pages 36, 96.

Size for cord wood, if desired, pages 37, 96.

Should be lined with fire-brick or cast-iron, page 38.

Front or arch should be supported with iron bars, page 96.

HEARTHS.—Should rest on trimmer arches, pages 34, 79.

The header should rest in bridle iron on the trimmer beams, pages 34, 78, 79.

Mitred borders should be provided around hearths, already referred to, page 82.

CHIMNEY BREASTS.—Avoid wooden lathing and furring; only metallic lathing should be used.

MANTELS.—Should not, if of wood, project too far over fire, page 84.

CENTRE STUDS.—For supporting deer heads, heavy pictures, etc., pages 38, 77.

PLASTERING.—Metallic lathing preferable, especially for ceilings over cellar and main floor; under side of staircases and chimney breasts, and over furnace pipes, page 39.

Provide for $\frac{7}{8}$" grounds, page 78.

Stipulate that plaster shall not be stacked or made in cellar; it injures floor beams.

Avoid wood ceilings and side walls, page 40; if used, back up solid with plaster.

If wooden lathing, stipulate as per specifications, page 102.

If hair plastering, be sure enough hair is provided—good long cattle hair.

See that plaster is made at least two weeks before using and in manner prescribed, page 103.

King's Windsor Cement, page 39; should be applied as per directions on barrel heads; so stipulate.

Back Plastering—already provided for.

HEIGHT OF CEILINGS.—Recommend 8 feet for cellar; 11 for first story, 10 for second, and 9 for third.

DOORS.—Front door and any door exposed to heat on one side should be veneered, page 82.

(Note.—The front door may be a Dutch door, if preferred, *i. e.*, divided into two parts.)

Specify "stock" sizes to save expense of unusual sizes, which have to be made to order.

Provide ground glass transoms, one foot high, page 83.

Examine to see doors are of uniform heights; some, however, prefer doors to closets in rooms lower than the doors of exit.

See that specifications call for double studs to all doors and windows.

See that specifications require that all doors and windows over three feet wide shall be trussed, to relieve the door of the weight above it.

Door sills should be of hardwood, oak or maple, page 82, and the front door sill should be rebated, to prevent snow and rain blowing in, page 78.

Cellar door, hatchway, etc. Provide as specified, page 83.

WINDOWS.—Should be "stock" sizes, except for fine views, where wider and of plate glass, page 41.

Should be uniform heights, page 42.

If opening on piazza, may be either sliding or French windows, page 42.

Examine to see that room is left for bedsteads, bureaus, buffets, etc., page 43.

Stipulate for metal pockets and flashing, to prevent leaks, page 88.

Provide for double studs and trussing, as already explained.

Stipulate for iron bars to cellar windows, 89, 99.

FLY AND MOSQUITO SCREENS, p. 43.

OUTSIDE BLINDS.—Specify clear wood, primed, painted two coats and best angle hinges.

STORM DOORS AND SHUTTERS.—Should be nailed with wrought nails clinched.

Should be marked to correspond with openings.

May have small glass lights page 43.

Door to kitchen to have same key as inner door.

CLOSETS.—Be sure to have enough, p. 44.

Ceilings should be same height as that of rooms.

Doors should not open into closets.

Specify shelves, width and distance between; drawers; height of hooks, etc., p. 44, 85.

Ventilate with windows wherever possible, especially Linen Closet, p. 44, 49.

Moth-proof closets, of cedar or camphor, page 44.

DINING ROOM.—Should be on coolest side of house, p. 10, 44.

Should not be over or near kitchen, p. 10.

Should have fly or swing door to butler's pantry, ground glass, but a narrow border of clear glass, to enable parties approaching to see each other, p. 43.

Arrange for location of push button to bell and have wire inserted before laying floor.

See that space is left for Buffet, p. 44.

KITCHEN.—Should be on cool side of house, p. 45; well ventilated, high windows and low door.

Should have "Heat and Odor Extinguisher," p. 45.

Should have ventilating flue in chimney next smoke flue. (It costs nothing) p. 45.

Should have storm door hung on hinges, with Yale lock, same key as inner door, already referred to, p. 46.

Should have dresser, closet for pots and kettles, and architect should prepare details before taking estimates.

Should have small clock shelf.

Should have wide rubbed slate hearth to range.

Should have galvanized iron or enameled iron sink.

Hot water boiler should be large—63 gallons—of copper or galvanized iron—latter good enough, p. 108.

LAUNDRY.—If possible, arrange so that both kitchen and laundry help to ventilate each other, with doors opposite, p. 67.

Arrange for laundry stove, and see that Mason's Specifications provide for thimble in flue for stovepipe.

Soiled clothes chutes, if any, should be of metal.

BUTLER'S PANTRY.—This convenient, even if you keep no butler.

Should have outside door, p. 46, and window for ventilation and light.

Should have marble sink and galvanized iron or enameled iron tray.

Should be large.

Should have opening for passing dishes into dining room closet.

REFRIGERATOR.—Should be convenient to butler's pantry, dining room and kitchen, and therefore between the last two.

Should have drip pipe to outside of house, not connected with sewer, p. 46.

STORE ROOM.—Should be convenient to kitchen; have an outside window and be of good size.

Should be rat and mouse proof by inserting cheap galvanized wire netting behind plaster and between floors, p. 47.

BATH ROOM.—Should have water-proof floors, with small lead pipe drain to outside, p. 47.

Should have wainscot of marble, tile, King's Windsor Cement or Keene's Cement, painted, or hard wood or yellow pine, shellacked, etc.

Have bath room systems over each other, to save piping.

If tiled, with gold bead ornament, do not have any gold bead near the floor, p. 49.

Have 2″ waste and trap, to prevent overflow.

Provide for supplying tub at top or bottom, p. 48.

Have enameled iron tubs, either enameled roll tops or wooden tops, p. 47. I used tubs, closets, etc., manufactured by the Standard Manufacturing Co., of Pittsburg, and am well pleased with them.

Paint outside of bath tubs, p. 48, 109.

WATER CLOSETS.—Have ventilating back air pipe and be sure to have soil pipe to the roof not less than 4 inches in diameter, p. 106.

SLOP CLOSETS.—Should have outside window.

Should have automatic flush, enameled iron basin, etc., p. 49, 50.

TOILET AND LAVATORY FIRST FLOOR.—Can be arranged under main staircase, p. 49.

Be sure to have outside window.

SEWING ROOM.—Provide one, p. 49.

STAIRCASES.—Front or main staircase should be quarter sawn oak, p. 83.

Should have wide treads and $6\frac{1}{2}$″ risers.

All staircases should have centre carriage timber, p. 51.

The outside or unsupported stringer should be 3″x8,″ p. 51.

Plaster under side of staircase on metallic lathing and insert fire-stops, p. 102.

Rear staircases should be extra strong, for carrying up furniture, etc., 3′ 6″ wide, and should have wide doors top and bottom.

Be sure to require architect to furnish detail main staircase in time to decide as to railing, balusters and newell posts.

HEATING.—Have large furnace, p. 53.

Should be in centre of cellar.

Should have double pipes in walls, p. 51.

Should have galvanized cold-air box, p. 52, 105.

Lathing over hot air pipes should be metallic, p. 52.

Cover pipes with asbestos board, p. 51.

Have suspended shield over furnace to protect floor beams above, p. 106.

Have principal register fastened open, or without valve, p. 53.

Do not have a floor register directly over the furnace, p. 53.

LIGHTING.—If by gasolene gas, get specifications from the Springfield Gas Machine Company, p. 110.

Be sure to have piping arranged to completely drain the entire system to the tank or meter, p. 110.

All side lights or bracket lights should be supplied from below, p. 111.

Plan outlets, especially for side light brackets, with reference to bureaus, writing desks, etc., p. 54

Have gas pipes of proper size, p. 54.

ELECTRIC LIGHTING.—Get rules of underwriters and base your specifications on these, p. 54.

ELECTRIC BELLS.—Have push buttons conveniently located as suggested, p. 56.

SPEAKING TRUMPETS to kitchen and cellar, p. 56.

WATER TANK.—Specify if of iron or wood, p. 55, 86, 107.

Have overflow to cistern to save water, p. 55.

Be sure to have drain pipe at bottom, to empty tank in the fall, p. 107.

Be sure to have tank large enough, p. 55.

Paint timber and woodwork in attic around tank with fireproof paint, p. 55.

(Note.—If house is near a hill with higher ground, it will pay to have a brick cistern on hill, to relieve house of the weight of a water tank and insure a larger supply of water, which can be pumped into it from well as easily as into a tank on the roof.)

HARDWARE.—It is best for you to select and therefore to furnish the finishing hardware specified, p. 56.

Select round wood knobs for upstairs doors.

Have metal sash chains, especially for plate glass windows, with 2½" pulleys, p. 57.

Stipulate windows to be weighed and balanced with weights.

Have all weights over 20 pounds, of lead, p. 57.

STANDING TRIM, ETC.—This should be time-seasoned or kiln-dried.

It should be back primed before brought to premises, p. 84.

Be sure to have architect furnish full details before taking estimates, p. 57, 58.

PICTURE MOULDING.—Provide for, p. 84.

PAINTING.—Specify colors, etc., by having samples. If pieces of wood painted, cut in two and give half to painter retaining half for yourself.

Require best materials.

Finish floors in wax, varnish or otherwise, as you prefer.

LIGHTNING ROD.—Must be of proper size, p. 60.

Must reach moist ground or the water in well.

Must have numerous points on roof, p. 60.

DUMB WAITER.—See p. 85.

PLUMBING.—Compare your specifications carefully with plumbing specifications, p. 106.

Be sure to have lead supply pipe of proper strength.

Be sure to have 2" wastes and traps.

Be sure to have main water supply pipe to house from cistern, tank or city water, of large size, not less than 1½", and of galvanized iron or lead, p. 107.

Be sure to have soil pipe carried through roof at least 4" in diameter; it is liable to have its capacity reduced by frost and ice, p. 106.

Be sure to have your plumbing in sight, and where it passes from floor to floor, encased in ducts, with removable doors or sides.

LUGGAGE ROOM.—Insert strong iron hooks for clothes lines for drying, p. 50.

CISTERNS.—Should be carefully constructed as per directions p. 62, 100.

CESS-POOL.—To be constructed as per directions, p. 100.

Be sure to have it a safe distance from your well—at least 100 feet. Sometimes this is not a safe distance in other than sandy soil, where the dip of rock strata or clay beds would hold and carry seepage.

Have the water of your well analyzed by a good chemist. Typhoid fever is always swallowed.

TEMPORARY PRIVY FOR WORKMEN p. 90.

BUILDING DEPARTMENT.—If your building comes within the rules of the Building Department see that your plans are approved before taking estimates or signing contracts; it costs nothing to be sure, and it is better to be sure than sorry.

ALTERNATE ESTIMATES p. 91.

SPECIFICATIONS.—Have specifications signed when contract is signed—your copy especially.

INDEX.

INSURE YOUR PROPERTY IN

THE CONTINENTAL FIRE INSURANCE CO.

It has a Cash Capital of

ONE MILLION OF DOLLARS,

Cash Assets of over

SEVEN AND A HALF MILLIONS OF DOLLARS,

A Reserve for the security of Insurance in force amounting to over

THREE AND A HALF MILLIONS OF DOLLARS,

and a Net Surplus, above the Capital and all liabilities, of over

TWO AND A HALF MILLIONS OF DOLLARS.

It has paid Losses to date amounting to the large sum of

THIRTY-SIX MILLIONS OF DOLLARS.

It conducts its business under the provisions of the Safety Fund Law of the State of New York, and has in the two Safety Funds

TWELVE HUNDRED THOUSAND DOLLARS.

In the great Chicago fire, which occured in the year 1871, it paid, in cash, losses amounting to nearly Two Millions of Dollars, and so strong were its Reserves that *it did this without impairing its Capital.* Thirteen months later, it paid in consequence of the large fire in the city of Boston nearly Three-Quarters of a Million of Dollars.

Such facts as these should recommend the Company to all having property to insure. Why should you select a weak Company when you can just as well select a strong one, which has been tried by passing through conflagrations in consequence of which one hundred Companies failed? The best is the cheapest. Especially is it incumbent upon trustees, guardians, executors, agents and others acting in a fiduciary capacity to select for those whose interests are intrusted to their charge, unquestioned indemnity.

If you desire insurance on property, of any kind, and will send us a postal card we will save you all trouble by having our representative call on you. An examination of the list of Directors of this Company should be satisfactory evidence to anyone, that the connection with it by men of such standing in the community is further evidence of its reliability.

Principal Office: 46 Cedar Street, New York.

Brooklyn Department:
***Cor. Court and* Montague Sts.**

Western Department:
Rialto Bld'g, Chicago, Ills.

Ask the Agent of the Continental to explain to you the importance of

THE SAFETY FUND LAW OF NEW YORK,

under which this Company conducts its business.

It is optional with a Company as to whether or not it will voluntarily place its business under the restrictions of this law, but once having done so, it cannot withdraw and must ever thereafter restrict its dividends in accordance therewith. Under this law the Continental has *increased its loss-paying ability, during the past two years, over eight hundred thousand dollars.*

It was the first and largest Company to comply with the act. The Safety Fund Law provides a Special Reserve Fund for a new Capital, deposited with the Insurance Department of the State of New York, now amounting in the case of the Continental to $600,000, which together with its reserve for policies in force, amounting to $3,523,299, is set aside for the protection of all policy-holders not involved in the burning of a city. Over one hundred Companies failed by the great fires of Chicago and Boston, thirteen months apart; it is therefore very important to property-owners to be insured in a large Safety Fund Company. If they happen to be involved in a sweeping city fire they will receive more under this law than under any other; and if not so involved, are absolutely secure and will be as fully insured as if no such great fire had happened. In addition to this fact the Continental has so regulated its conflagration lines in cities as to have less than its Net Surplus involved anywhere; so that, in case of the burning of any city, it would have an unimpaired capital for the protection of its unburned policy-holders.

A Safety Fund Policy costs no more than any other.

INSURE WITH AN AMERICAN COMPANY.

STATEMENT.

CONTINENTAL INSURANCE CO.,

46 Cedar Street, New York.

January 1, 1897.

Cash in Banks and on hand,	$ 294,565.86
Loans on Bond and Mortgage, (On Real Estate worth $296,100.)	106,060.00
U. S. and other Stocks and Bonds owned by Co.,	5,560,440.00
Real Estate owned by the Company,	1,236,250.00
Premiums in course of collection,	498,711.25
Interest and Dividends (due and accrued)	79,395.86
Rents accrued,	924.16
Total Assets,	**$7,776,347.13**

Reserve for Insurance in force,	**$3,523,299.59**
Reserve for Losses,	**270,634.80**
Reserve for Commissions, Taxes and all claims,	**168,193.98**
Reserve for Contingencies,	**250,000.00**
Cash Capital,	**1,000,000.00**
Net Surplus,	**2,564,218.76**
	$7,776,347.13

Directors of the Continental Insurance Co.

WILLIAM L. ANDREWS.
GEORGE T. BLISS.
JAMES FRASER.
WILLIAM H. HURLBUT.
H. H. LAMPORT.
EDWARD MARTIN.
JOHN L. RIKER.
LAWRENCE TURNURE.
CYRUS PECK.
SAMUEL D. BABCOCK.
CLARENCE W. BOWEN.
AURELIUS B. HULL.
WILLIAM G. LOW.
RICHARD A. McCURDY.
ALEX. E. ORR.
ALFRED RAY.
THEO. F. VAIL.
CHAS. A. MOORE.
JACOB WENDELL.

F. C. MOORE, President.

HENRY EVANS, Vice President.

EDWARD LANNING, Secretary.

C. H. DUTCHER, Sec'y Brooklyn Dep't.

WESTERN DEPARTMENT, Rialto B'ld'g, Chicago, Ills.

***J. J. McDONALD*, Gen'l M'g'r.** **G. E. KLINE, Ass't Gen'l M' ' .**